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ABSTRACT

This revised manual for the General Aptitude Test Battery (GATB) discusses: (1) historical development; (2) item analysis; (3) factor analysis; (4) physical format; (5) general working population norms (ages 18-54); (6) intercorrelations of raw GATB test scores and of GATB aptitude scores; (7) development of norms for specific occupations (tables present data for various GATB validity studies on 446 occupations defined by the Dictionary of Occupational Titles); (8) development of norms for specific occupations; (9) validity of norms for specific occupations; (10) development of Occupational Aptitude Pattern Structure; (11) validity of Occupational Aptitude Pattern norms; (12) relationship of aptitudes to college success; (13) effectiveness of tests in selection and counseling; (14) correlations with 40 other standardized tests; (15) reliability and effects of practice; (16) effect of training on scores; (17) effect of sex, minority group status, and cultural exposure on scores; (18) effect of aging on scores; (19) effect of disabilities on scores; (20) 9th and 10th grade norms; (21) use of the GATB with the disadvantaged; (22) use of test results; and (23) a 706-item bibliography. (CP)

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1970

Manual for the
USES

General Aptitude Test Battery

Section III:
DEVELOPMENT

UNITED STATES DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION
Washington, D.C. 20210

U.S. DEPARTMENT OF HEALTH,
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Foreword

General Aptitude Test Battery (GATB) was developed by the United States Employment Service and has been used since 1947 by State employment service offices. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base, the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

Many schools and other organizations have been authorized to use the GATB for counseling and research. Information regarding release of the GATB tests for these purposes may be obtained from State Employment Services.

The Manual for the General Aptitude Test Battery is published in four separate sections as follows:

Section I, *Administration and Scoring,* contains the procedures for administration and scoring of the GATB, and conversion of the raw test scores to aptitude scores. Separate editions of Section I are published for B–1001 (the mark-in-booklet version) and B–1002 (separate answer sheet version).

Supplement to Section I for B–1002 contains the modifications in procedures in the administration and scoring of the GATB using the IBM 1230 or Op-Scan separate answer sheets. It is to be used in conjunction with Section I for B–1002.

Section II, *Norms, Occupational Aptitude Pattern Structure,* shows the GATB occupational aptitude pattern structure which is used for counseling purposes. GATB norms for adults and 9th and 10th graders are shown for occupational families.

Section III, *Development,* contains technical information on the development of the GATB; procedures for GATB occupational validation research; techniques used in developing the GATB occupational aptitude pattern structure; statistics on the relationships between the GATB and other tests; information on the effects of age, sex, minority group status, cultural exposure, disabilities, and training on aptitude scores; information on the development of GATB norms for 9th and 10th graders; and guidelines for using GATB results.

Section IV, *Norms, Specific Occupations,* contains GATB aptitude test norms used for selection for specific occupations. Also includes alphabetical and industrial indices of the many occupations for which norms have been developed.

Copies of Sections II, III and IV of the *Manual* are available to the public from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Section I of the *Manual* is on restricted sale. Further information regarding Section I may be obtained from State Employment Services.

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1. Construction of Tests

HISTORICAL DEVELOPMENT

Before the development of the GATB, separate tests had been constructed to measure the various abilities that seemed related to success in different occupations. Each time the study of a different occupation was undertaken, new tests would be devised if the job analysis indicated that some ability seemed to be important and the store of USES tests did not already include such a test. Each test was constructed with items that were as homogeneous as possible with regard to the abilities they seemed to measure, but varied in difficulty. Over a period of time, about 100 tests, composed of items such as arithmetic, vocabulary, and surface development were developed. In addition, certain apparatus tests were devised. By a process of factor analysis (see Chapter 3 of this Section) 11 paper-and-pencil tests and 4 apparatus tests were selected from this group of tests as the best measures of 10 factors or abilities. These tests formed the first edition of the GATB, B–1001. Thus, in about 2½ hours it was possible to measure all of the major abilities represented in the entire stock of USES tests. Since 1945 the GATB has been used as the standard experimental battery in every aptitude study that has been undertaken for the development of occupational norms. Previously about 15 tests would be chosen as the experimental battery for the study of an occupation, as a result of estimates derived from the job analysis, and a different experimental battery was used for each study. Consequently, there was a possibility that some ability might have turned out to be significant in the job when tests of that ability were not tried out in the experimental battery. Moreover, the grouping of jobs into families, on the basis of similarities in abilities, could not readily be accomplished, because all the occupational samples had not been given the same tests.

STEPS IN CONSTRUCTION OF TESTS

The procedures used in the development of the separate-answer-sheet form of the GATB (B–1002) were as follows:

1. The construction of items for the IBM 805 separate-answer-sheet form of the GATB (B–1002) involved two major phases: (1) the revision of test items that had been included in the original edition of the GATB, B–1001, to adapt them for use with a separate answer sheet; and (2) the construction of new test items. This did not apply to the test measuring Motor Coordination, which does not lend itself to the use of a separate answer sheet. It was necessary to construct a large number of new test items to allow for the elimination of some items as a result of the findings of item analysis studies which were to be conducted, and to provide a sufficient number of items for the development of an alternate form of each separate-answer-sheet test to be included in B–1002. The primary task in the revision of the B–1001 items to adapt them for a separate answer sheet was conversion to the multiple-choice type of all items that were not already in this form. In developing new test items, an effort was made to construct items that would measure, as closely as possible, the same abilities that were measured by the test items that had been used in the original edition of the General Aptitude Test Battery. The items that had been in use and the newly constructed items were arranged in the experimental form of each test in apparent order of difficulty. The relative difficulty had to be determined subjectively at this point because the performance of examinees on all of these items was not yet known. The experimental form of each test included approximately 20 percent more than twice the number of items to be included in each final form of the test. For example, if for

a particular test it was planned to have 50 items in the final form and 50 items in its alternate, the experimental form of that test included about 120 items.

2. An IBM 805 separate answer sheet was constructed for the experimental form of each paper-and-pencil test, except for the test measuring Motor Coordination. At this point, there was an individual separate answer sheet for each test, even though plans called for the inclusion of several tests on each answer sheet in the final form of the battery. An attempt was made to devise answer sheets which would result in maximum clarity for the examinees and would facilitate the administration of the tests. An appropriate scoring stencil was devised for each of the answer sheets, and directions were prepared for administration and scoring of the tests for experimental purposes.

3. The next step was to administer the experimental form of each test (except the Motor Coordination test), untimed, to a sample of approximately 200 people to obtain item analysis data and information such as the time required for the test to be completed, difficulties occasioned by use of the separate answer sheet and any problems encountered in test administration. The administration directions called for the examiner to record his observations on these points. In most instances only one of the GATB tests was administered to an experimental sample; but, in a few cases, the experimental sample took two of the tests. The experimental administration of each test was without a time limit in order to permit each examinee to attempt all of the test items so that item analysis data would be available for every item, and to collect data for the establishment of suitable time limits for the tests

4. Some experimental work was also done with the motor tests to determine the time limits and scoring procedures which would yield optimum results with respect to the reliability of the tests and the time required for administering and scoring. This involved administering these tests to various samples for several test-retest reliability studies in which different time limits and scoring techniques were employed and the number of test trials was varied.

5. After the experimental data were collected, item analysis studies were conducted to determine the difficulty level and discriminating value of each item (except for items on the Motor Coordination test). The difficulty level was determined by finding the number of correct responses that were made to each item. To determine the discriminating power of each item, each sample was divided into quartiles based on the distribution of the total scores on each test; subsequently, for each item, the significance of the difference between the percentage of correct responses in the highest and lowest quartiles was determined. The significance of the difference was determined in each instance by obtaining the critical ratio equal to the difference divided by the standard error of the difference. (See Chapter 2 of this Section.)

6. For the final form of each test (except the Motor Coordination test) items were selected that met the criteria established for discriminating value and difficulty level. In general, items with the lowest critical ratios or items that were too easy were eliminated or revised. (See Chapter 2 of this Section.) A few very easy items were placed at the beginning of each test for warm-up purposes, and all items in the final form of the test were arranged in increasing order of difficulty. Alternate forms of each test were made as equal as possible with respect to the difficulty levels and discriminating values of the items included on each form. Time limits, which were long enough to enable obtaining a sufficient sample of each examinee's performance with respect to each test, and which were short enough to insure that very few, if any, examinees would complete each test, were set in accordance with the findings of the experimental studies.

7. The final forms of the IBM 805 answer sheets were constructed in accordance with findings of the experimental studies and suggestions made by the test examiners who participated in these studies. Answer sheets were devised so that each one included spaces for the responses to several tests and at the same time were arranged to facilitate the tasks for both the examinees and the test examiners. Appropriate scoring stencils were devised for the answer sheets.

8. Results of the experimental studies on the motor tests were analyzed, and the time limits and scoring procedures were determined accordingly. As a result of these studies, a change was made which simplified the scoring of the paper-and-pencil motor test. It was found that none of the experimental time limits or modifications in administration and scoring procedures for the apparatus tests resulted in sufficient increase in reliability over the reliability obtained with the procedures used in B–1001 to justify the necessary increase in testing time that would be required if the new procedures were put into use. Therefore, it was decided to use the same administration and scoring procedures for B–1002 that had been used for the apparatus tests in B–1001. (See Section I of the *Manual for the GATB.*)

9. The directions for the administration and scoring for the final form of B–1002 were prepared. The findings of all experimental studies were taken into account in the preparation of these administration and scoring procedures. (See Section I of the *Manual for the GATB.*)

10. Several studies were also conducted to determine the alternate form reliability and comparability of each of the separate-answer-sheet tests. These studies have shown that Forms A and B of each test are not sufficiently identical with respect to their raw score means and standard deviations to use the same conversion table for Forms A and B of each test to convert raw test scores to aptitude scores. Therefore, a separate conversion table was developed to convert the raw test scores of Form B of each test to aptitude scores. Reasonably close agreement between the aptitude scores derived from Forms A and B of the separate-answer-sheet tests was obtained in the alternate form reliability studies. (See Chapter 15 of this Section.)

11. Consideration was given to the possibility of reducing the administration time of the battery without any appreciable loss in measurement by omitting from B–1002 several tests that had been included in B–1001. Two tests, designated as Part F and Part H, had been included in B–1001 as measures of Spatial Aptitude. Since Part F had been weighted so that it contributed an insignificant amount to the measurement of Spatial Aptitude (see Chapter 3 of this Section), and since Part H by itself had shown substantially high test-retest reliability (.84), it was concluded that Part F could be omitted from B–1002 without reducing the effectiveness of the battery. Therefore, only one measure of Spatial Aptitude was included in B–1002.

In B–1001 there had been some overlapping among the measures of Aptitude A—Aiming or Eye-Hand Coordination and Aptitude T—Motor Speed. Eye-Hand Coordination had been measured by the tests designated as Part C and Part K and Motor Speed had been measured by Part G and Part K. Since many validation studies on occupational samples yielded results which were quite similar for Eye-Hand Coordination and Motor Speed, it was concluded that it was not necessary to have two separate measures of these aptitudes included in the battery. Therefore, only Part K, which is a measure of both Eye-Hand Coordination and Motor Speed, was selected from the three paper-and-pencil tests of motor abilities (Parts C, G, and K) that had been in B–1001 for inclusion in B–1002. Further evidence of the overlapping of these two aptitudes was found in a study of 121 knitting mill workers, tabulating machine operators, and hand decorators, in which a correlation of .81 was obtained between Eye-Hand Coordination and Motor Speed (Boulger, 1952). The test-retest reliability of Part K (.91) justifies using it as a single measure. Part K of B–1001 has been designated as Part 8 in B–1002. The aptitude measured by Part 8 in B–1002 was named Motor Coordination.

Thus, whereas B–1001 included 15 tests measuring 10 aptitudes, B–1002 includes 12 tests measuring 9 aptitudes. The 12 tests included in B–1002 and the 9 aptitudes that they measure are described in Chapter 4 of this Section.

12. In the late 1950's an answer sheet for the GATB which could be scored by optical scanning equipment was developed in a special research study conducted by William J. Schrader of the U.S. Army Ordnance Corps and Dr. Kenneth B. Hoyt of the State University of Iowa for use on Measurement Research Center

(MRC) equipment. Examinees had difficulty using the first answer sheet (MRC–A); therefore a revised answer sheet was prepared (MRC–B). Significant differences were found between scores made on the IBM 805 answer sheet and those made on the MRC–A for Parts 1–7 of the GATB. A similar comparison between MRC–A and MRC–B revealed no significant differences. Due to administrative problems, a direct comparison between the IBM 805 and the MRC–B answer sheets was not made.

13. In 1962, the employment service also began work to develop an answer sheet for the GATB which could be scored by optical scanning equipment. The DocuTran (Science Research Associates) answer sheet developed was put into operational use in 1963 following a comparability study conducted in California, Pennsylvania and West Virginia. The comparability study showed that adjustments for raw scores on Parts 1, 3, 4, 5 and 7 on the DocuTran answer sheet were needed to make them comparable to scores on IBM 805 answer sheets. The DocuTran answer sheet had very cramped response areas. Therefore, when the expanded NCS answer sheet described below was introduced, use of the DocuTran answer sheet fell off quickly. Although the DocuTran answer sheet is no longer available, the development of this answer sheet represented the employment service's entry into the area of optical scanning of answer sheets and computerized conversion of raw scores to aptitude scores.

14. In 1964 National Computer Systems (NCS) answer sheets for Forms A and B of the GATB, B–1002, were developed on the basis of a comparability study (described in Chapter 7 of this Section). The results showed that adjustments were required on Parts 1, 2, 5 and 7 on the NCS answer sheet to make them comparable to scores on the IBM 805 answer sheets. Therefore, separate aptitude conversion tables were developed for those tests for the NCS answer sheets.

15. In the mid–1960's one of the apparatus suppliers developed a lighter and more compact version of the Pegboard used to measure Parts 9 and 10. This Pegboard and the pegs used with it are made of durable plastic, whereas other versions of the Pegboard and the pegs used with them are made of wood. Because of the possible effect of different types of apparatus on scores obtained, several comparability studies were conducted. A study completed by the Employment Security Commission of North Carolina in 1970 indicated that there are no significant differences between scores obtained with the wooden and plastic Pegboards. As this study involved a review of all known previous research on the matter as well as independent research, the two types of Pegboards should be considered interchangeable.

16. In 1969 answer sheets for Forms A and B of the GATB were developed which could be scored on IBM 1230, 1231 or 1232 optical scanning equipment. This study (described in Chapter 7 of this Section) was conducted by the Utah Test Development Center in cooperation with the California, Michigan, Texas, and Ohio agencies. The results showed that slight adjustments were needed in Part 5 scores to make the scores comparable to the scores obtained using the IBM 805 answer sheet. Therefore, separate aptitude conversion tables were prepared for that test for the IBM 1230–1232 answer sheets.

17. In 1970 a Digitek answer sheet (produced by the Optical Scanning Corporation) was developed for Form B. A comparability study conducted by the Ohio State Department of Education indicated that adjustments were needed in scores obtained on Part 1 of the Digitek answer sheet to make them comparable to scores on the IBM 805 answere sheet.

REFERENCE

Boulger, J. R. The generalized distance function and differential aptitude testing. Unpublished doctoral dissertation, Univer. of Minnesota, 1952.

2. Item Analysis

COLLECTION OF DATA

The experimental forms of the tests to be included in the separate-answer-sheet form of the GATB (B–1002) were administered untimed to several experimental samples to obtain data for item analysis purposes. The tests were administered untimed so that each examinee would have an opportunity to work all of the items. In all, a total of 10 samples, ranging in size from 196 to 236 examinees each, were tested for this purpose in Colorado, Florida, Michigan, Ohio, Texas, Utah, and Wisconsin. The experimental samples included local Employment Service office applicants, high school juniors and seniors, college sophomores and juniors, commissioned and noncommissioned officers of the United States Air Force, and some groups such as business women's clubs and civic luncheon groups.

METHODS OF ITEM ANALYSIS

The data were analyzed to determine the difficulty level and diagnostic value or discriminating power of each item. The difficulty level was determined by counting the number of correct responses to each item. To determine the discriminating power of each item, each sample was divided into quartiles based on the distribution of total scores for each test; subsequently, for each item, the significance of the difference between the percentage of correct responses in the highest and lowest quartiles was determined. The significance of the difference was determined in each instance by obtaining the critical ratio equal to the difference divided by the standard error of the difference. To eliminate the necessity of calculating each critical ratio, reference was made to an abac devised by Mosier & McQuitty (1940) from which the critical ratios could be read directly once the percentage of correct responses in the highest and lowest quartiles was known.

RESULTS OF STUDIES

The results of the item analysis studies differed for the power tests (such as the numerical and verbal tests) and speed tests (such as the name-comparison test). As would be expected, the power tests yielded a wider range of item difficulty than the speed tests as well as exhibiting a correspondingly wider range than the speed tests for the discriminating power or diagnostic values of the items. In the selection of items for the final forms of the power tests, items that were too easy and those that did not show sufficiently great diagnostic power were eliminated. In general, items that had critical ratios of less than 2 were not included in the final forms of the tests. However, several very easy items were placed at the beginning of each test for warm-up purposes. The alternate forms of each test were made as equivalent as possible by including in each form an equal number of items of the same difficulty level and discriminating power. The items on the final form of each test were arranged in increasing order of difficulty.

Since differentiation of individuals on speed tests is determined primarily by the rate at which each examinee works items that are relatively homogeneous in difficulty, the criteria employed for selecting items for the final forms of the power tests were not applied to the same extent to the speed tests. However, since some of the speed-test items did vary in difficulty level and discriminating power from others, these factors were used as guides in selecting items for and arranging them on the final forms of the speed tests.

The results of the item analysis studies made it quite apparent that the tests measuring Form Perception and Clerical Perception are primarily speed tests and those measuring Intelligence, Numerical Aptitude, Spatial Aptitude, and Verbal Aptitude are primarily power tests. No item in the tests of Form Perception

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and Clerical Perception was failed by more than 40 percent of the experimental sample during the untimed administration; whereas the range for the percent failing items on the other tests extended up to 94 percent. The tests measuring Motor Coordination, Finger Dexterity, and Manual Dexterity, which were not included in the item analysis studies because standard item analysis procedures are not applicable to these types of tests, are also speed tests.

REFERENCE

Mosier, C. I., & McQuitty, J. V. Methods of item validation and abacs for item-test correlation and critical ratio of upper-lower difference. *Psychometrika,* 1940, 5, 57–65.

3. Factor Analysis

EMPLOYMENT SERVICE FACTOR ANALYSIS STUDIES

Purpose

The purpose of the factor analysis studies conducted during the period 1942 to 1944 (Staff, Division of Occupational Analysis, War Manpower Commission, 1945) was to isolate and identify the basic aptitudes underlying the large number of aptitude tests then used by the Employment Service, and to select those few tests providing the best measures of these basic aptitudes for combination into a test battery particularly suitable for use in counseling.

Experimental Design

Several experimental batteries of tests were administered to a total of 2,156 persons who were divided into 9 groups for the factor analysis studies. Table 3–1 shows for each of these groups the number of subjects tested, the number of tests administered, and the geographical location of the subjects.

The number of persons in each of the 9 factor analysis groups varied from 98 to 1,079. In all, 2,156 persons from 12 different geographical locations were tested. Six of the factor analysis groups were independent; Group 7 was a combination of Groups 1, 5, and 6; Group 8 consisted of the subjects from Group 2 plus additional subjects. The number of tests administered to each of the groups varied from 15 to 29. There was a great deal of overlapping of the tests among the several batteries; but, in all, 59 tests were subjected to analysis. In addition to the tests, age and education were included as variables.

Group 0 consisted of 1,079 male applicants for defense training courses in Erie and Pittsburgh. The age of the subjects ranged from 17 to 39 years, with a mean of 23 years, and all had completed at least 6 years of education. In the remaining eight experimental groups, all of the subjects were males and most of them were trainees enrolled in Vocational Education National Defense Training courses. The age of the subjects ranged from 17 to 39 years, with a mean of 28 years. The mean number of years of education completed was 11, and 99 percent of the subjects had completed between 8 and

Table 3–1. Description of the Experimental Groups

Group	Number of Subjects	Number of Tests	Location
0	1,079	19	Erie and Pittsburgh
1	221	25	Dallas and St. Louis
2	99	29	Sacramento
3	141	15	West Virginia
4	138	25	Philadelphia
5	275	27	Cincinnati, Detroit, Cleveland, Toledo, and Chicago
6	98	28	Chicago
7	594	25	Composite of Groups 1, 5, and 6
8	204	24	Same as Group 2

Note.—Group 8 includes all of Group 2 plus additional subjects from the same training course for whom data on 5 tests were not available.

16 years. It is estimated that about 5 percent of the sample were Negro, and the rest white. Since the samples tested consisted only of male applicants for, or enrollees in, defense training courses, they could not be considered representative of the more heterogeneous general working population. However, the age, education, and experience background of the subjects is quite similar to that of the type of Employment Service counselees for whom a differential aptitude battery would be most useful and to whom such a battery would be most often administered in practice.

General Description of the Tests

Of the 59 different tests used in the several factor analysis studies, 54 (48 paper-and-pencil tests and 6 apparatus tests) were constructed by the Employment Service. The other five tests were the *O'Rourke Survey Test of Vocabulary (Form X4)*, the *Revised Minnesota Paper Form Board* (Likert and Quasha), the *Minnesota Spatial Relations Test*, the *Minnesota Manual Dexterity Test—Placing*, and the *Minnesota Manual Dexterity Test—Turning*.

The 54 Employment Service tests included in the factor analysis studies are representative of the approximately 100 tests developed by the Employment Service over a period of years. (See Chapter 1 of this Section.) During the initial phases of the Employment Service testing program, it was intended to construct aptitude tests which appeared to have validity for occupations but which were not so analogous to specific jobs as to impair the applicability of the tests for widespread use. Emphasis was placed on development of tests of perceptual and spatial ability and of dexterity, although some verbal and "intellectual" tests were also devised. In general, the tests are speed tests with time limits for the most part of about 5 minutes. The individual tests are homogeneous in content; that is, each test is made up of items which appear to measure only one type of ability. All of the tests are so constructed that they can be easily administered by personnel without extensive technical training.

The Factors

Thurstone's methods of multiple-factor-analysis were employed to extract the centroid factors from the correlational matrices and to rotate them to a meaningful structure of underlying aptitudes. For each group, a solution was first obtained which satisfied the criteria of simple structure. Simple structure is essentially the factor analysis analogue of the doctrine of parsimony and is obtained in the rotational process by maximizing the number of zero loadings on as many factors as possible. This is equivalent to describing each test in a given battery in terms of a minimum number of the common factors required to account for the intercorrelations of the battery as a whole.

It was discovered in each group that the first solutions had very nearly orthogonal simple structures. The factors in an orthogonal structure are entirely independent and uncorrelated; when the factors are correlated among themselves the structure is said to be oblique. Since the structures were very nearly orthogonal, and inasmuch as the solutions were not so exact that different investigators would have obtained identical correlations between the factors, it was decided to impose an orthogonal structure on each group and the rotational process was continued until this was achieved. An important advantage to the final solutions so obtained is that comparisons of the results are rendered less ambiguous, since reference can be made to factors which bear an identical relation to all other factors in each group.

Consistent results were obtained from the several correlational matrices, in that the factors common to a related group of tests could always be demonstrated regardless of the composition of the remainder of the experimental battery. The loadings of a factor on a test for different groups varied to about the same extent as correlations for identical pairs of tests in the different groups. The smallest number of common factors established in any group was seven, and the largest was ten. In all, 11 different common factors were found. They were named as follows:

G—Intelligence
V—Verbal Aptitude
N—Numerical Aptitude
S—Spatial Aptitude
P—Form Perception

Q—Clerical Perception
A—Aiming
T—Motor Speed
F—Finger Dexterity
M—Manual Dexterity
L—Logic

Table 3–2 shows the common factors identified for each group.

Table 3–2. Common Factors Identified for Each Factor Analysis Group

Group	Factors										
0	G			S	P	Q	A	T	F	M	
1	G	V	N	S	P	Q	A	T	F	M	
2	G		N	S	P	Q	A	T	F	M	
3	G		N	S	P	Q		T	F	M	L
4	G		N	S	P	Q		T			L
5	G	V	N	S	P	Q	A	T	F	M	
6	G	V	N	S	P	Q	A	T	F	M	
7	G	V	N	S	P	Q	A	T	F	M	
8	G		N	S	P	Q	A	T			

Factor L (Logic) was found in only two of the nine factorial studies. This factor appears to be a narrow reasoning factor, since all of the four or five tests with significant projections on this factor in Groups 3 and 4 require the solution of problems by formal rational processes. It is possible that the reason why Factor L was not found in other factorial studies was that only one of the tests with substantial loadings on this factor in Groups 3 and 4 was administered to any of the other groups. In any case, since Factor L was tentatively found in only two of the nine studies, this factor could not be definitely established. Because the evidence supporting Factor L was not conclusive, no attempt was made to set up a test battery for measuring this factor.

Factor G presents difficulties in interpretation. This factor was found in each of the nine groups and is present in significant amount in about two dozen tests. Like all of the other factors, it is an independent first-order factor established in a position orthogonal to all the rest. The tests which have significant projections on this factor include all of the verbal tests, all of the numerical tests (except the two speed tests of one-digit arithmetic), and almost all of the spatial tests. Factor G was also present in a letter series test, a word memory test, and a perceptual relations test; this is interesting because none of these tests have significant projections on either V, N, or S. Factor G appears to have some of the properties of Spearman's "g", but Spearman's theory that a single common factor of intelligence underlies the intercorrelations among psychological tests does not allow for group factors like those found in these studies. On the other hand, Factor G has a wider significance and is more persistent than the deductive or inductive reasoning factors found by Thurstone. Perhaps a more plausible hypothesis is that Factor G consists primarily of general reasoning ability, since it closely resembles the general reasoning factor found in studies conducted by the Army Air Forces in World War II. However, since Factor G possesses many of the properties that teachers, test examiners, and clinical psychologists would attribute to general intellectual ability, the factor was designated as "intelligence." (In the original report of the factor analysis studies, this factor was designated as Factor O.)

Selection of Tests for Inclusion in the General Aptitude Test Battery, B–1001

After the factor analysis studies had been completed, tests were selected for inclusion in an aptitude battery designed to provide a separate measure for each of the 10 aptitude factors that had been definitely established. These tests were selected on the basis of two criteria:

1. Internal or factorial validity. The size of the factor loading of a test provides evidence pertaining to the validity of the test with respect to the factor measured. Since there was some variation from study to study in the size of the loading of a given test on a given factor, the estimated factorial validity of each test was determined on the basis of a comparison of the factor loadings in the various studies in which both the test and factor appeared.

2. External or practical validity. This was determined on the basis of a review of the

demonstrated relationship between each test and concrete criteria obtained in a variety of occupational validation studies. High correlation with external criteria of success for a number of jobs is evidence of broad practical value of the test as used in actual prediction.

Application of these two criteria to the Employment Service tests resulted in selection of 12 paper-and-pencil and 4 apparatus tests for inclusion in the initial edition of the General Aptitude Test Battery, B–1001. Part E, a letter series test, was subsequently dropped from the battery because of difficulties encountered in the administration of this test to some occupational samples for research purposes. The factor loadings assigned the 15 tests finally selected for the GATB were the typical loadings obtained for these tests from all of the factor analysis studies in which these tests had been included.

A multiple-factor loading was computed for each factor measured by more than 1 of the 15 selected tests by applying the Wherry-Doolittle Test Selection Method to the test intercorrelations from a sample of 519 employed workers and to the factor loadings of the tests measuring the factor. A single factor loading represents an estimate of the internal or factorial validity of a single test with respect to the factor measured by the test. In the same sense, a multiple-factor loading represents an estimate of the factorial validity of the best weighted composite of two or more tests with respect to the factor measured in common by these tests. (For a complete description of the procedure for weighting tests measuring a given factor see Chapter 7 of this Section.) Table 3–3 shows for each of the 10 aptitude factors identified from the factor analysis studies the B–1001 tests selected for measuring the apti-

Table 3–3. The 10 Aptitudes Identified from the Factor Analysis Studies, the B–1001 Tests Selected for Measuring Each Aptitude, the Factor Loadings of These Tests, and the Multiple-Factor Loading for Each Aptitude

Aptitude Factor	Test	Factor Loading	Multiple Factor Loading
G—Intelligence	H—Three-Dimensional Space	.450	.602
	I—Arithmetic Reason	.552	
	J—Vocabulary	.513	
V—Verbal Aptitude	J—Vocabulary	.533	.533
N—Numerical Aptitude	D—Computation	.483	.500
	I—Arithmetic Reason	.438	
S—Spatial Aptitude	F—Two-Dimensional Space	.397	.503
	H—Three-Dimensional Space	.500	
P—Form Perception	A—Tool Matching	.520	.549
	L—Form Matching	.435	
Q—Clerical Perception	B—Name Comparison	.627	.627
A—Aiming	C—H Markings	.473	.506
	K—Mark Making	.423	
T—Motor Speed	G—Speed	.709	.780
	K—Mark Making	.708	
F—Finger Dexterity	O—Assemble	.595	.629
	P—Disassemble	.486	
M—Manual Dexterity	M—Place	.628	.662
	N—Turn	.500	

tude, the factor loadings of these tests, and the multiple-factor loading for each aptitude.

AIR MATERIEL COMMAND FACTOR ANALYSIS STUDY

The following is an abstract of a factor analysis study conducted by Wherry and Black (1952) for the Civilian Personnel Division of the Air Materiel Command.

Purpose

To determine (1) the relative adequacy of certain Air Materiel Command tests, the GATB (B–1001), and two Civil Service Commission test batteries for use in the Air Force selection and assignment testing program; and (2) the combination of tests from these batteries which would constitute the best long and short batteries.

Method

Thurstone's method of factor analysis was used to determine the group factors measured by the subtests of the batteries and how well each subtest measures each factor. Brogden's method was used to rotate the general factor into the first-order domain.

Sample

All 4 AMC tests, 16 of the CSC tests, and the 12 paper-and-pencil tests of the GATB, B–1001, were administered to 200 mechanical trainees. The 4 apparatus tests of the GATB and a pin dexterity test of the CSC were administered to a smaller sample of 103 of the original 200 cases.

Table 3–4. Comparison of AMC with Factor Loadings on the Seven Factors Found in Both AMC and Studies for GATB, B–1001, Tests

Factor	GATB Test	Factor Loading	
		USTES	AMC
G—Intelligence	H—Three-Dimensional Space	.45	.29
	I—Arithmetic Reason	.55	.57
	J—Vocabulary	.51	.79
V—Verbal Aptitude	J—Vocabulary	.53	.38
N—Numerical Aptitude	D—Computation	.48	.47
	I—Arithmetic Reason	.44	.45
S—Spatial Aptitude	F—Two-Dimensional Space	.40	.66
	H—Three-Dimensional Space	.50	.68
P—Form Perception	A—Tool Matching	.52	
	L—Form Matching	.44	
Q—Clerical Perception	B—Name Comparison	.63	.62
A—Aiming	C—H Markings	.47	
	K—Mark Making	.42	
T—Motor Speed	G—Speed	.71	.71
	K—Mark Making	.71	.65
F—Finger Dexterity	O—Assemble	.60	.58
	P—Disassemble	.49	.46
M—Manual Dexterity	M—Place	.63	
	N—Turn	.50	

Note.—USES factors P, A, and M were not found in the AMC study.

Results Pertaining to the GATB

Twelve orthogonal factors were obtained in the AMC study. Seven of these factors were also found in the factor analysis studies. Table 3–4 shows a comparison of AMC with factor loadings on these seven factors for the GATB, B–1001, tests selected as measures of each factor. Table 3–5 shows a comparison between the AMC factor structures and the Wherry and Black comments on the success of GATB tests in measuring AMC factors. This table shows that all of the AMC factors are measured by GATB tests except Spelling and Mechanical Information.

The factor analysis results, together with time requirements, administrative facility, and estimated reliability were used as the basis for selecting short and long batteries. Seven GATB tests were recommended for the selected best short battery and 10 were recommended for the selected best long battery. The seven GATB tests selected for the short battery are Parts B, D, E, F, G, J, and O. The three additional GATB tests selected for the long battery are Parts H, K, and P.

Results from the AMC study support the findings that a general factor is present in significant amounts in the GATB tests selected for measuring this factor. Wherry and Black comment on the general intelligence factor obtained in their study as follows:

"This factor has high loadings for most of the subtests which have loadings on the factors identified as Verbal, Number, Reasoning, Space, Memory, Mechanical Information, Spelling, and Perceptual Speed. It is clearly related to Spearman's "g". It is the factor which most oblique axes analysts attempt to hide or neglect in the intercorrelations among their oblique axes. It is composed of the type of items found on the various revisions of the Binet and other "Intelligence" tests. We therefore accept the name of *General Intelligence* without any qualms. It is best measured by verbal and numerical tests, less well by spatial tests, and poorly, but significantly, by perceptive tests."

It is interesting to note that the intelligence

Table 3–5. Comparison Between AMC Factor Structures and the Wherry and Black Comments on Success of GATB Tests in Measuring AMC Factors

Factor	AMC Factor	Wherry and Black Comments on Success of GATB Tests in Measuring AMC Factors
G—Intelligence	General Intelligence	Excellent measurement.
V—Verbal	Verbal	Well measured.
N—Numerical	Number	Well measured.
S—Spatial	Spatial	Excellent measurement.
P—Form Perception	(²)	
Q—Clerical	Perceptual Speed	Excellent measurement.
A—Aiming	(²)	
T—Motor Speed	Motor Speed	Excellent measurement.
F—Finger Dexterity	Coordination	Well measured.
M—Manual Dexterity	(²)	
(¹)	Reasoning	Well measured (E, I).
(¹)	Memory	Well measured (A, E, K).
(¹)	Visual Search	Moderately well measured (E, P).
(¹)	Spelling	Not measured.
(¹)	Mechanical Information	Not measured.

¹ Not found in USES studies.
² Not found in AMC study.

factor and the AMC general intelligence factor both resulted from studies based on adult samples. This tends to dispose of some theories that this factor could be established only among children and that it amounts to a common maturational factor.

REFERENCES

Staff, Division of Occupational Analysis, War Manpower Commission. Factor analysis of occupational aptitude tests. *Educ. psychol. Measmt*, 1945, 5, 147–155.

Wherry, R. J., & Black, Thelma L. *A factorial analysis of four test batteries.* Dayton: Air Materiel Command, Directorate of Personnel and Training, Wright-Patterson Air Force Base, 1952.

4. Composition of the GATB

TESTS IN B-1002

The separate-answer-sheet form of the GATB, B–1002, is composed of 12 tests selected because they are good measures of 9 aptitudes found to be important for successful performance in a wide variety of occupations. Of the 12 tests, 8 are paper-and-pencil tests and 4 are apparatus tests. The paper-and-pencil tests appear in three booklets: Book I contains Parts 1 through 4; Book II contains Parts 5 through 7; and Part 8, which is not machine scorable, appears in a separate booklet. Two of the apparatus tests (Parts 9 and 10) involve the use of the USTES Pegboard; the other two apparatus tests (Parts 11 and 12) involve the use of the USTES Finger Dexterity Board. Approximately 2½ hours are required to administer the GATB, B–1002.

ALTERNATE FORMS

An alternate form is available for each of the separate-answer-sheet tests in B–1002, Parts 1 through 7. The two forms of these tests have been designated as Form A and Form B; different answer sheets, scoring stencils, and aptitude score conversion tables have been developed for each form.

FORMAT OF THE PAPER AND PENCIL TESTS

In the main, the format of each of the tests is similar. Following the title of the test, a brief statement explains what is to be done by the examinee. A few sample exercises illustrate clearly what the examinee is to do and the procedure for working each exercise. The examinee is then given an opportunity to try a few practice exercises. After the practice exercises have been attempted, the examiner determines whether or not the examinee understands the instructions and assists him in the event of difficulty. This procedure is basic, because each test is given to measure a particular aptitude, not to determine if the examinee can follow instructions. A statement of the time limit for each test and other appropriate instructions follow the practice exercises. Then examinees work on the test proper. The tests contain more items than can ordinarily be completed in the time allowed.

DESCRIPTIONS OF TESTS IN THE GATB, B–1002

The tests in B–1002 are described below. The aptitude or aptitudes measured by each test follow each definition.

Part 1—Name Comparison

This test consists of two columns of names. The examinee inspects each pair of names, one in each column, and indicates whether the names are the same or different. Measures Clerical Perception.

Part 2—Computation

This test consists of a number of arithmetic exercises requiring the addition, subtraction, multiplication, or division of whole numbers. Measures Numerical Aptitude.

Part 3—Three-Dimensional Space

This test consists of a series of exercises containing a stimulus figure and four drawings of three-dimensional objects. The stimulus figure is pictured as a flat-piece of metal which is to be either bent, or rolled, or both. Lines indicate where the stimulus figure is to be bent. The examinee indicates which one of the four drawings of three-dimensional objects can be made from the stimulus figure. Measures Intelligence and Spatial Aptitude.

Part 4—Vocabulary

This test consists of sets of four words. The examinee indicates which two words have either the same or opposite meanings. Measures Intelligence and Verbal Aptitude.

Part 5—Tool Matching

This test consists of a series of exercises containing a stimulus drawing and four black-and-white drawings of simple shop tools. The examinee indicates which of the four black-and-white drawings is the same as the stimulus drawing. Variations exist only in the distribution of black and white in each drawing. Measures Form Perception.

Part 6—Arithmetic Reason

This test consists of a number of arithmetic problems expressed verbally. Measures Intelligence and Numerical Aptitude.

Part 7—Form Matching

This test consists of two groups of variously shaped line drawings. The examinee indicates which figure in the second group is exactly the same size and shape as each figure in the first or stimulus group. Measures Form Perception.

Part 8—Mark Making

This test consists of a series of squares in which the examinee is to make three pencil marks, working as rapidly as possible. The marks to be made are short lines, two vertical and the third a horizontal line beneath them. Measures Motor Coordination.

Part 9—Place

The equipment used for this test and for Part 10 consists of a rectangular pegboard divided into two sections, each section containing 48 holes. The upper section contains 48 cylindrical pegs. The examinee removes the pegs from the holes in the upper part of the board and inserts them in the corresponding holes in the lower part of the board, moving two pegs simultaneously, one in each hand. This performance is done three times, with the examinee working rapidly to move as many of the pegs as possible during the time allowed for each of the three trials. Measures Manual Dexterity.

Part 10—Turn

The equipment described under Part 9 is also used for this test. For Part 10 the lower section of the board contains the 48 cylindrical pegs. The examinee removes a wooden peg from a hole, turns the peg over so that the opposite end is up, and returns the peg to the hole from which it was taken, using only his preferred hand. The examinee works rapidly to turn and replace as many of the 48 cylindrical pegs as possible during the time allowed. Three trials are given for this performance. Measures Manual Dexterity.

Part 11—Assemble

The equipment used for this test and for Part 12 consists of a small rectangular board (Finger Dexterity Board) containing 50 holes, and a supply of small metal rivets and washers. The examinee takes a small metal rivet from a hole in the upper part of the board with his preferred hand and at the same time removes a small metal washer from a vertical rod with the other hand; examinee puts the washer on the rivet, and inserts the assembled piece into the corresponding hole in the lower part of the board using only his preferred hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity.

Part 12—Disassemble

The equipment used for this test is the same as that described for Part 11. The examinee removes the small metal rivet of the assembly from a hole in the lower part of the board, slides the washer to the bottom of the board, puts the washer on the rod with one hand and the rivet into the corresponding hole in the upper part of the board with the other (preferred) hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity.

DEFINITIONS OF APTITUDES MEASURED IN GATB, B–1002

The nine aptitudes measured by B–1002 are defined below. The letter used as the symbol to identify each aptitude precedes each aptitude name. The test(s) of the GATB measuring each aptitude follow each definition. The aptitude definitions are based on the factor analysis studies described in Chapter 3 of this section. Hence, some of the aptitude definitions do not correspond exactly to the definitions of the test(s) which measure them. The definitions describe the factor being measured rather than the specific test(s) chosen to represent the factor.

Aptitude G—Intelligence

General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school. Measured by Parts 3, 4, and 6.

Aptitude V—Verbal Aptitude

The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. Measured by Part 4.

Aptitude N—Numerical Aptitude

Ability to perform arithmetic operations quickly and accurately. Measured by Parts 2 and 6.

Aptitude S—Spatial Aptitude

Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space. Measured by Part 3.

Aptitude P—Form Perception

Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines. Measured by Parts 5 and 7.

Aptitude Q—Clerical Perception

Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. A measure of speed of perception which is required in many industrial jobs even when the job does not have verbal or numerical content. Measured by Part 1.

Aptitude K—Motor Coordination

Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly. Measured by Part 8.

Aptitude F—Finger Dexterity

Ability to move the fingers, and manipulate small objects with the fingers, rapidly or accurately. Measured by Parts 11 and 12.

Aptitude M—Manual Dexterity

Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions. Measured by Parts 9 and 10.

DESIGNATIONS OF CORRESPONDING TESTS IN B–1002 AND B–1001

Below are listed the name of each test in B–1002, its designation or part number in B–1002, and the letter designation of the test in B–1001. (Parts C, F, and G of B–1001 have not been included in B–1002.)

Name of Test	Designation in B–1002	Designation in B–1001
Name Comparison	Part 1	Part B
Computation	Part 2	Part D
Three-Dimensional Space	Part 3	Part H
Vocabulary	Part 4	Part J
Tool Matching	Part 5	Part A
Arithmetic Reason	Part 6	Part I
Form Matching	Part 7	Part L
Mark Making	Part 8	Part K
Place	Part 9	Part M
Turn	Part 10	Part N
Assemble	Part 11	Part O
Disassemble	Part 12	Part P

5. General Working Population Norms

The initial general working population norms for the General Aptitude Test Battery were based on the first 519 employed workers tested with the GATB. It was recognized that this sample probably was not truly representative of the general working population, but since it did include a wide range of occupational classifications, it was believed to yield a reasonably close approximation to test performance typical of the general working population. In 1952, general working population norms were established on the basis of a selected sample of 4,000 which was stratified to obtain proportional occupational representation of the general working population. Procedures employed in the development of these norms are described in detail below. No substantial differences in magnitude were obtained between norms based on the GATB General Working Population Sample of 4,000 and the initial norms based on the sample of 519 employed workers.

The GATB General Working Population Sample of 4,000 had been tested with the first edition of the GATB, B-1001. Studies were conducted to determine the relationship between B-1001 and Form A of B-1002, the separate-answer-sheet form of the GATB. Conversion tables resulting from these studies were used to convert norms based on B-1001 data to general working population norms for Form A of B-1002. Table 5-1 shows the means and standard deviations of (1) scores on each GATB test in B-1002, Form A, (2) years of age, and (3) years of education for the GATB General Working Population Sample. The constant "a" is included in Table 5-1 for convenience, and the use of the constant

Table 5-1. Means (M_g) and Standard Deviations (σ_g) of Scores on Each Test of GATB, B-1002, Form A, Years of Age, and Years of Education for the GATB General Working Population Sample, and the Constant "a" for Each Test—N=4,000

Variable	M_g	σ_g	$a=\frac{\sigma_g}{20}$
1—Name Comparison	46.684	17.887	.894366
2—Computation	24.308	6.996	.349791
3—Three-Dimensional Space	15.800	6.101	.305040
4—Vocabulary	20.144	10.233	.511655
5—Tool Matching	30.717	7.410	.370481
6—Arithmetic Reason	11.016	4.244	.212196
7—Form Matching	25.563	7.112	.355577
8—Mark Making	69.477	10.321	.516064
9—Place	89.795	8.615	.430730
10—Turn	100.846	9.646	.482281
11—Assemble	28.333	4.561	.228073
12—Disassemble	29.507	3.737	.186860
Age (Years)	30.390	9.927	
Education (Years)	10.972	2.569	

"a" is explained later in this discussion. Comparability studies were also conducted between Form A and Form B of B–1002 and conversion tables resulting from these studies were used to derive equivalent scores for the sample of 4,000 on Form B of B–1002. Table 5–8 shows the mean, standard deviation, and constant "a" for each test in Form B of the GATB, B–1002 for the sample of 4,000.

POPULATION

The base population for the GATB general working population norms study is the employed labor force in the age range 18–54 as recorded in the 1940 Census of the Population (U.S. Department of Commerce, Bureau of the Census, 1943). Since the 1950 Census report was not available when this study was conducted, it was not possible to use 1950 Census data as originally planned. In order to estimate how well the 1940 data reflected subsequent conditions, reference was made to Bureau of the Census statistical adjustments of the 1940 Census data based on a sample from the 1950 Census (U.S. Department of Commerce, Bureau of the Census, 1951). However, the Census adjustments did not prove to be extensive. The proportions of workers in various occupational groups remained substantially unchanged; differences were found primarily in the geographic distribution of workers.

The employed labor force as recorded in the 1940 Census was 45,166,083. For the purpose of this study, certain deletions were made that resulted in an abstracted base population of 24,219,021.

1. The base population was restricted to those employed workers in the age range of 18 through 54 years.

2. The base population was further curtailed by eliminating all farmers, farm laborers, farm managers; and foremen, all proprietors, managers, and officials; and all service workers.

The latter deletion of specified occupational groups was made partly because tests are not generally in use in those occupational areas, and partly because of the difficulty in collecting data for those occupations. If at some future time the GATB is used in the occupational areas deleted from the base population, appropriate adjustments can be made.

Table 5–2 shows the composition of the base population in terms of the occupational groups established by the Bureau of the Census.

Table 5–2. Number and Percent of the 24,219,021 Base Population in Occupational Groups Established by the Bureau of the Census

Occupational Group	Number	Percent of Base Population
Professional and Semiprofessional Workers (D.O.T. 0)	2,918,775	12.05
Clerical, Sales, and Kindred Workers (D.O.T. 1)	6,961,865	28.75
Craftsmen, Foremen, and Kindred Workers (D.O.T. 4 & 5)	4,202,396	17.35
Operatives and Kindred Workers (D.O.T. 6 & 7)	7,497,853	30.96
Laborers, except Farm and Mine (D.O.T. 8 & 9)	2,638,132	10.89
Total	24,219,021	100.00

Note.—The base population represents the 1940 employed labor force in the age range 18 through 54 for selected occupational groups. The occupational groups in this table are those used by the Bureau of the Census. Corresponding D.O.T. (2nd edition) major occupational code groups are noted in parentheses.

SAMPLE

In order to establish a set of norms for the working population as defined in the 1940 Census of the United States, a representative sample of 4,000 cases was selected from more than 8,000 cases for which appropriate research data were available. These 4,000 cases selected for the standard sample have been designated as the GATB General Working Population Sample. Only 4,000 of the 8,000 cases were selected for inclusion in the standard sample because it was found that a larger sample could not be stratified properly. The mean age of the standard sample was 30.4 years with a standard deviation of 9.9, and the mean education was 11.0 years with a standard deviation of 2.6. According to Census data the median educational level for the general working population is 10.2 years for males and 11.7 years for females (U.S. Department of Commerce, Bureau of the Census, 1949).

SAMPLING DESIGN

The stratified quota method of sampling was employed insofar as practicable (Peatman, 1947, p. 310). This method consists of stratifying the sample to make it proportionally representative of the base population with respect to selected control factors. Occupation, sex, age, and geographic location were considered in selecting the sample. Race or minority group status were not considered in selecting the sample because it was against regulations at the time to record this information. However, it is known that Negroes and some other minorities are represented in the sample. Since it was not possible, with the amount of data available, to achieve the desirable stratification with respect to all factors considered, occupation was established as the primary control factor.

Occupation

It was necessary to base occupational stratification on the Bureau of the Census occupational classification system because the population data were compiled according to this system. Although the Census classification system is somewhat broader than that of the Dictionary of Occupational Titles (Census classifies primarily by skill level and industry; the second edition of the D.O.T. classifies by skill level, industry, and occupation) the broader classifications of the Census Bureau were considered adequate for purposes of this study. Within each selected occupational group apportionment was made to assure a broad representation of specific occupations.

Sex

The fact that men tend to score higher on Spatial Aptitude and lower on Clerical Perception than do women (See Chapter 17) makes it necessary to give attention to the problem of stratification of the population on the basis of sex differences. Since the M–F ratio in a given occupational area is constantly shifting to reflect current economic conditions, use of 1940 Census data for purposes of stratification on the basis of sex ratio is questionable. For example, the influx of women into industry during World War II increased the proportion of women in certain occupations. As a matter of fact, the question of whether the General Working Population Sample should reflect the current M–F population ratio is a debatable one. Certainly the M–F ratio for the general working population is not typical of those found in individual occupational samples. Typical samples are made up of either a relatively large proportion of males or females. A conviction that use of a disproportionate number of men or women in the GATB General Working Population Sample would tend to reduce the value of the norms when used as a standard of comparison for groups composed of mostly men or mostly women led to the decision to compose the sample of half males and half females. This ratio was approximated rather than obtained exactly in order to achieve proper occupational representation with available data.

Age

Since the GATB was seldom used for counseling individuals outside the age range of 18 through 54 years, and the preponderance of research data available was for workers in this age range, it was decided to represent that portion of the general working population which fell within this age range. Therefore, only workers 18 through 54 years of age were considered when the occupational composition of the base population was determined. However, the standard sample of 4,000 includes a negligible number (approximately 3½ percent) of individuals outside this age range in order to include occupations which would not otherwise be represented. Inclusion of these data insures wide representation of occupations within each occupational group.

Geographic Distribution

For purposes of defining the sample the geographic distribution has been noted. Table 5–3 shows the geographic distribution by region of

Table 5–3. Number and Percent of the GATB General Working Population Sample and Percent of the 1940 Employed Working Population in Each Geographical Region

Region	Percent of Employed Working Population (1940 Census)	Percent of GATB General Working Population Sample	No. of GATB General Working Population Sample
North Eastern	29.06	28.22	1,129
North Central	30.17	44.65	1,786
South	30.17	21.40	856
West	10.60	5.73	229
Total	100.00	100.00	4,000

Note.—The regions are those employed by the Bureau of the Census. The States in each region are as follows:

North Eastern

- Connecticut
- Maine
- Massachusetts
- New Hampshire
- New Jersey
- New York
- Pennsylvania
- Rhode Island
- Vermont

North Central

- Illinois
- Indiana
- Iowa
- Kansas
- Michigan
- Minnesota
- Missouri
- Nebraska
- North Dakota
- Ohio
- South Dakota
- Wisconsin

South

- Alabama
- Arkansas
- Delaware
- Florida
- Georgia
- Kentucky
- Louisiana
- Maryland
- Mississippi
- North Carolina
- Oklahoma
- South Carolina
- Tennessee
- Texas
- Virginia
- West Virginia
- District of Columbia

West

- Arizona
- California
- Colorado
- Idaho
- Montana
- Nevada
- New Mexico
- Oregon
- Utah
- Washington
- Wyoming

the GATB General Working Population Sample as compared with that of the employed working population.

The result of a Chi Square test of the divergence between hypothetical and sample proportions in the geographical regions indicates that the obtained differences cannot reasonably be attributed to chance errors in random sampling. Two explanations of the differences between hypothetical and sample proportions are suggested for the two regions (North Central and South) showing the greatest absolute differences.

1. Larger samples are more easily obtainable in the large centralized industries of the North Central region than in the less industrially developed South. Consequently, relatively more data were available for the North Central region.

2. Regional differences in the relative numbers of different occupations available for study tends to make more GATB data available for the occupationally diversified North Central region than for the South.

It is believed that although the sample geographical distribution does not represent the theoretical distribution adequately, the differences are not large enough to cause an appreciable error in the norms.

The final structure of the sample was the result of a compromise between the desire to follow the above stratification procedure as closely as possible and the desire to make use of as much of the available GATB data as possible. The composition of the GATB General Working Population Sample is shown in Table 5–4.

Table 5–4. Number (Total, Male, Female) and Percent of the GATB General Working Population Sample in Selected Occupational Groups

Occupational Group	Percent	Number		
		Total	Male	Female
Professional & Semiprofessional Workers (D.O.T. 0)	12.05	482	430	52
Clerical, Sales, & Kindred Workers (D.O.T. 1)	28.75	1,150	389	761
Craftsmen, Foremen, & Kindred Workers (D.O.T. 4 & 5)	17.35	694	644	50
Operatives & Kindred Workers (D.O.T. 6 & 7)	30.95	1,238	295	943
Laborers, except Farm and Mine (D.O.T. 8 & 9)	10.90	436	76	360
Total	100.00	4,000	1,834	2,166

Note.—The occupational groups shown in this table are those used by the Bureau of the Census. Corresponding D.O.T. (2nd edition) major occupational code groups are noted in parentheses.

NORMS FOR B–1001

All parts of the GATB, B–1001, had been administered to the 4,000 people used in the final sample. Table 5–5 shows the means and standard deviations of (1) scores on each GATB test in B–1001, (2) years of age, and (3) years of education for the GATB General Working Population Sample.

Table 5–6 shows the means and standard deviations of (1) scores on each GATB test in B–1001, (2) years of age, and (3) years of education for each selected occupational group included in the GATB General Working Population Sample and for the total sample. These occupational groups conform to the Bureau of the Census classification. Bureau of the Census occupational groups are classified as follows (D.O.T. 2nd edition code groups in parentheses):

Group:	*Occupation*
I	Professional and Semiprofessional Workers (D.O.T. 0)
II	Clerical, Sales, and Kindred Workers (D.O.T. 1)
III	Craftsmen, Foremen, and Kindred Workers (D.O.T. 4 & 5)

Table 5–5. Means (M_g) and Standard Deviations (σ_g) of Scores on Each Test of GATB, B–1001, Years of Age, and Years of Education for the GATB General Working Population Sample—N=4,000

Variable	M_g	σ_g
A—Tool Matching	21.819	6.115
B—Name Comparison	70.675	22.120
C—H Markings	44.243	7.499
D—Computation	28.063	8.105
F—Two-Dimensional Space	23.169	8.132
G—Speed	134.326	20.700
H—Three-Dimensional Space	19.002	7.000
I—Arithmetic Reason	9.882	3.812
J—Vocabulary	21.483	9.402
K—Mark Making	69.477	10.321
L—Form Matching	26.947	8.073
M—Place	89.795	8.615
N—Turn	100.846	9.646
O—Assemble	28.333	4.561
P—Disassemble	29.507	3.737
Age (Years)	30.390	9.927
Education (Years)	10.972	2.569

Table 5–6. GATB General Working Population Sample Means (M) and Standard Deviations (σ) of Scores on Each Test of GATB, B–1001, Years of Age, and Years of Education for Each Selected Occupational Group and Total

Variable	Group I N=482	Group II N=1,150	Group III N=694	Group IV N=1,238	Group V N=436	Total N=4,000
A—Tool Matching:						
M	25.0	23.6	19.0	20.9	20.5	21.8
σ	5.3	5.9	5.7	5.8	6.0	6.1
B—Name Comparison:						
M	86.4	82.2	57.3	63.4	65.0	70.7
σ	18.9	20.4	17.8	18.9	19.5	22.1
C—H Markings:						
M	48.6	46.1	40.7	43.1	43.5	44.2
σ	6.8	7.0	7.6	7.0	7.1	7.5
D—Computation:						
M	36.1	31.2	25.6	24.8	24.2	28.1
σ	5.2	7.1	7.6	6.9	7.7	8.1
F—Two-Dimensional Space:						
M	29.9	23.9	22.9	21.2	20.0	23.2
σ	7.3	7.5	8.1	7.7	7.3	8.1
G—Speed:						
M	146.0	140.3	126.1	129.2	133.3	134.3
σ	18.9	19.2	21.4	19.4	18.3	20.7
H—Three-Dimensional Space:						
M	25.3	19.2	19.7	16.9	16.2	19.0
σ	6.7	6.4	7.2	6.1	6.0	7.0
I—Arithmetic Reason:						
M	14.6	10.7	9.5	8.2	7.8	9.9
σ	3.3	3.4	3.3	3.2	2.5	3.8
J—Vocabulary:						
M	32.0	24.9	19.4	16.7	17.5	21.5
σ	9.2	8.3	8.1	7.0	7.1	9.4
K—Mark Making:						
M	73.6	73.2	63.2	68.0	69.4	69.5
σ	10.9	9.0	10.7	9.4	8.8	10.3
L—Form Matching:						
M	33.0	28.1	24.6	25.6	24.8	26.9
σ	8.1	7.4	7.9	7.5	7.7	8.1
M—Place:						
M	93.5	88.1	88.7	90.0	91.6	89.8
σ	8.3	8.8	8.3	8.4	8.1	8.6
N—Turn:						
M	102.4	100.6	97.2	101.7	103.1	100.8
σ	9.5	9.2	9.7	9.4	9.8	9.6
O—Assemble:						
M	29.1	28.4	27.2	28.6	28.2	28.3
σ	4.4	4.7	4.5	4.5	4.5	4.6

***Table 5–6. GATB General Working Population Sample Means (M) and Standard Deviations (σ) of Scores on Each Test of GATB, B–1001, Years of Age, and Years of Education for Each Selected Occupational Group and Total*—Continued.**

Variable	Group I N=482	Group II N=1,150	Group III N=694	Group IV N=1,238	Group V N=436	Total N=4,000
P—Disassemble:						
M	29.5	29.8	28.3	29.6	30.4	29.5
σ	3.6	3.7	3.7	3.7	3.7	3.7
Age (Years):						
M	28.9	29.5	36.4	28.8	29.3	30.4
σ	8.1	10.1	9.8	9.6	8.8	9.9
Education (Years):						
M	14.4	11.8	10.0	9.8	9.8	11.0
σ	2.6	1.8	2.1	2.1	2.2	2.6

Group:	*Occupation*
IV	Operatives and Kindred Workers (Semiskilled Machine Operators and Kindred Workers) (D.O.T. 6 & 7)
V	Laborers, except Farm and Mine (D.O.T. 8 & 9)

For purposes of comparison with the latest GATB general working population norms, the initial GATB norms, based on the sample of 519 employed workers, are presented in Table 5–7 which shows the means, standard deviations, and critical ratios of the differences between means of the test scores on B–1001 for the two samples.

Since the limitations of the data available at the time the original 519 sample was obtained precluded any systematic stratification procedure, that sample could not be considered strictly representative of the working population. For example, no professional or semiprofessional (Group I) people were included in the 519 sample. As indicated in Table 5–6, this group tends to score higher on the GATB tests than do the other groups. The result of the omission of this important group becomes evident from inspection of the direction of the differences between means shown in Table 5–7 to be significantly different. In the case of 7 of the 8 tests for which significantly different means between the two samples were found, the means of the 519 sample are lower than those of the 4,000 sample. It should be noted that although eight of the differences were found to be statistically significant, none of these differences is very great in magnitude. Thus there are no substantial differences between the norms based on the GATB General Working Population Sample of 4,000 and the previous norms based on the sample of 519 employed workers.

CONVERSION OF NORMS FOR B–1001 TO NORMS FOR FORM A OF B–1002

As explained above, the norms originally developed for the GATB General Working Population Sample of 4,000 were based on test data for B–1001, the first edition of the GATB. These norms were converted to norms for Form A of B–1002, the separate-answer-sheet form of the GATB, by means of conversion tables which were developed on the basis of test data on both B–1001 and Form A of B–1002 for a total sample of 585 high school and junior college students tested in 3 different States. The general working population norms for B–1002 are shown in Table 5–1.

Table 5–7. Means (M), Standard Deviations (σ), and Critical Ratios (C.R.) of the Differences Between Means of the Test Scores on B–1001, for the Two GATB General Working Population Samples —N=4,000 and N=519

Test	N=4,000		N=519		C.R.
	M_g	σ_g	M	σ	
A—Tool Matching	21.8	6.1	21.2	5.7	2.24*
B—Name Comparison	70.7	22.1	71.3	20.1	.63
C—H Markings	44.2	7.5	44.1	7.4	.29
D—Computation	28.1	8.1	26.6	7.6	4.20**
F—Two-Dimensional Space	23.2	8.1	22.7	8.2	1.31
G—Speed	134.3	20.7	135.7	20.7	1.45
H—Three-Dimensional Space	19.0	7.0	17.5	6.9	4.65**
I—Arithmetic Reason	9.9	3.8	8.7	3.4	7.46**
J—Vocabulary	21.5	9.4	20.9	9.2	1.39
K—Mark Making	69.5	10.3	71.0	9.7	3.29**
L—Form Matching	26.9	8.1	26.3	7.8	1.64
M—Place	89.8	8.6	88.0	8.7	4.44**
N—Turn	100.8	9.6	101.1	8.7	.73
O—Assemble	28.3	4.6	27.6	4.6	3.26**
P—Disassemble	29.5	3.7	28.8	3.7	4.06**

* Significant at the .05 level.

** Significant at the .01 level.

DERIVATION OF STANDARD SCORES

Test scores on Form A of B–1002 may be expressed in terms of standard scores so that performance on GATB tests can be compared without reference to the original units. The following formula should be used for converting test scores to standard scores with an assumed general working population mean of 100 and standard deviation of 20:

$$X' = \frac{X - M_g}{a} + 100$$

Where

X' = standard score
X = raw test score
M_g = general population mean (from Table 5–1)
$a = \frac{\sigma_g}{20}$ (from Table 5–1)

To convert the mean of the raw scores of any test for a given sample to a standardized mean based on a distribution with an assumed mean of 100 and standard deviation of 20, the following formula should be used:

$$M' = \frac{M_s - M_g}{a} + 100$$

Where

M' = standardized mean for given sample
M_s = raw score mean for given sample
M_g = general population mean (from Table 5–1)
$a = \frac{\sigma_g}{20}$ (from Table 5–1)

To convert the standard deviation of the raw scores of any test for a given sample to a standardized standard deviation based on an assumed general population standard deviation of 20, the following formula should be used:

$$\sigma' = \frac{\sigma_s}{a}$$

Where

σ = standardized standard deviation for given sample

σ_s = raw score standard deviation for given sample

$a = \frac{\sigma_g}{20}$ (from Table 5–1)

NORMS FOR FORM B OF B–1002

Studies were conducted to determine the relationship between Form A of B–1002 and From B of B–1002. These studies were based on data on both Form A and Form B for a total sample of 412 high school juniors and seniors tested in 2 States. Conversion tables resulting from these studies were used to convert general working population norms of Form A of B–1002 to equivalent norms on Form B. Table 5–8 shows the means and standard deviations of Parts 1 through 7 of Form B of B–1002 for the GATB General Working Population Sample of 4,000. The constant "a" is also shown for each test in Table 5–8. Since Forms A and B of Parts 8 through 12 of B–1002 are identical, the norms for Form B of these tests are the same as those shown in Table 5–1 for Form A. The same procedure employed for obtaining standard scores for each test on Form A can be used to obtain standard score equivalents for raw test scores on Form B of B–1002.

Table 5–8. Means (M_g) and Standard Deviations (σ_g) of Parts 1 through 7 of Form B of B–1002 for the GATB General Working Population Sample and the Constant "a" for Each Test—N=4,000

Variable	M_g	σ_g	$a = \frac{\sigma}{20}$
1—Name Comparison	43.715	15.991	.799550
2—Computation	23.092	6.725	.336250
3—Three-Dimensional Space	16.815	6.523	.326150
4—Vocabulary	19.772	10.053	.502650
5—Tool Matching	29.123	6.619	.330950
6—Arithmetic Reason	11.426	3.511	.175550
7—Form Matching	23.921	6.947	.347350

STABILITY OF GENERAL WORKING POPULATION NORMS

In 1966 an aptitude intercorrelation study was conducted which involved data from 367 GATB occupational validation studies conducted between 1950 and 1966. (See Chapter 6, this Section.) Raw score data on the B–1001, B–1002A or B–1002B versions of the GATB were available on 23,428 employed workers, applicants, students and trainees. All raw scores were then converted to B–1002 equivalent aptitude scores and the means and standard deviations were computed for each of the nine aptitudes. As shown in Table 6–9, the mean scores are closely clustered around 100 (range of 97.5 to 103.5) and standard deviations are closely clustered around 20 (range of 17.3 to 21.4). Aptitude G has a mean score of exactly 100.0 and Aptitude S has a standard deviation of exactly 20.0. The median aptitude-score shown in Table 6–9 is 100.2 and the median standard deviation is 19.1.

As this study included all of the usable data available from occupational validation studies conducted during the 1950–1966 time period, the results shown in Table 6–9 give evidence as to the stability of aptitude score conversions described in this chapter.

CONCLUSIONS

The initial GATB general working population norms, based on the sample of 519 workers, served as a good basis for evaluating individual and group test results on the GATB during the first 5 years after the GATB was issued. Although statistically significant differences were found between the GATB general working population norms based on the sample of 4,000, and the initial norms based on the sample of 519, none of the obtained differences was very great in magnitude. In the sample of 4,000 it was possible to achieve exact representation of the base population with respect to broad occupational groupings. This is a desirable objective since the GATB is intended to be used for the evaluation of occupational potentialities. As more data become available, the GATB standard sample will be expanded to include all appropriate control factors, including minority group status.

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6. Intercorrelations

This chapter presents data on intercorrelations of raw GATB test scores and on intercorrelations of GATB aptitude scores. Samples for these intercorrelation studies are drawn primarily from groups of individuals to whom the GATB is usually administered for selection and counseling purposes, such as local Employment Service office applicants, high school seniors, and college freshmen. One sample consists of airmen tested during their basic training.

INTERCORRELATIONS OF RAW TEST SCORES

The intercorrelations of raw GATB test scores show some variation from one sample to another. The median test intercorrelation is about .35. Some aptitudes in the GATB are measured by combinations of tests which have high factor loadings on those aptitudes. (See Chapter 3 of this Section.) It is reasonable to expect that tests which are measures of the same aptitude will have relatively high intercorrelations. This is confirmed by the results of the studies presented in this section. For example, in Table 6–1, the highest correlation (.72) is between Test F and Test H, both measures of Spatial Aptitude, and between Test D and Test I, both measures of Numerical Aptitude. In Tables 6–2 and 6–4, the highest correlations (.78 and .66 respectively) are between the two tests which measure Numerical Aptitude. The lowest correlation (.03) in Table 6–1 is between Test N, which measures Manual Dexterity, and Test I, which measures Intelligence and Numerical Aptitude. Part E, a measure of intelligence which was subsequently dropped from B–1001, also has a correlation of .03 with Test N in Table 6–1. Tests N and I also have the lowest correlation (.09) in Table

Table 6–1. Intercorrelations of Tests in B–1001–N=519 Employed Workers

Test	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
A—Tool Matching															
B—Name Comparison	.60														
C—H Markings	.43	.47													
D—Computation	.44	.59	.35												
E—Letter Series	.52	.56	.34	.57											
F—Two-Dimensional Space	.56	.46	.39	.43	.63										
G—Speed	.39	.42	.45	.27	.30	.33									
H—Three-Dimensional Space	.46	.39	.34	.39	.59	.72	.30								
I—Arithmetic Reason	.40	.51	.31	.72	.66	.55	.29	.55							
J—Vocabulary	.35	.57	.36	.56	.59	.49	.40	.48	.66						
K—Mark Making	.39	.55	.58	.43	.28	.26	.65	.23	.31	.40					
L—Form Matching	.56	.47	.41	.36	.47	.60	.35	.52	.33	.31	.38				
M—Place	.22	.17	.28	.15	.12	.18	.32	.18	.12	.07	.30	.26			
N—Turn	.17	.20	.32	.10	.03	.10	.36	.08	.03	.06	.42	.18	.51		
O—Assemble	.27	.22	.32	.19	.24	.25	.36	.26	.16	.14	.32	.30	.35	.38	
P—Disassemble	.35	.35	.37	.33	.30	.27	.40	.24	.24	.19	.44	.33	.46	.37	.53

6–2. The lowest correlation (.16) in Table 6–4 is between Test 3, which measures Spatial Aptitude, and Test 8, which measures Motor Coordination.

The results from the four studies on intercorrelation of raw GATB test scores are summarized as follows:

	Intercorrelations	
Type of Sample	*Range*	*Median*
Employed Workers (N=519)	.03 to .72	.36
General Working Population (N=4,000)	.09 to .78	.38
High School Seniors (N=100)	—.13 to .62	.26
Basic Airmen (N=2,649) . . .	.16 to .66	.34

Employed Worker Sample

This sample consists of 519 employed workers, including 70 males and 449 females. It was used to establish the first set of general working population norms for the GATB, B–1001. (See Chapter 5 of this Section.) The mean age of the sample is 30.4 years with a standard deviation of 10.9 years; the mean education is 11.0 years with a standard deviation of 2.4 years. Results are shown in Table 6–1.

Intercorrelations of the 16 tests range from .03 (the correlation of Test N with Test E and Test I) to .72 (the correlation of Test D with Test I). Other high correlations are between Tests F and H, which measure Spatial Aptitude, and among Tests E, H, I, and J, which measure Intelligence. The median intercorrelation is .36.

General Working Population Sample

This sample is the GATB General Working Population Sample of 4,000, including 1,834 males and 2,166 females. This is the sample upon which general working population norms were established for B–1001. (See Chapter 5 of this Section.) The mean age of the sample was 30.4 years with a standard deviation of 9.9 years; the mean education was 11.0 years with a standard deviation of 2.6 years. Results are shown in Table 6–2.

Intercorrelations of the 15 tests of B–1001 range from .09 (between Test I and Test N) to .78 (between Tests D and I, the two tests which measure Numerical Aptitude). Another high correlation (.76) is between Tests F and H, which measure Spatial Aptitude. The median intercorrelation is .38.

High School Senior Sample

This sample consists of 100 high school sen-

Table 6–2. Intercorrelations of Tests in B–1001–N=4,000, General Working Population Sample

Test	A	B	C	D	F	G	H	I	J	K	L	M	N	O
A—Tool Matching														
B—Name Comparison	.64													
C—H Markings	.50	.55												
D—Computation	.49	.67	.43											
F—Two-Dimensional Space	.53	.47	.40	.51										
G—Speed	.42	.49	.56	.37	.37									
H—Three-Dimensional Space	.47	.38	.36	.45	.76	.33								
I—Arithmetic Reason	.42	.58	.37	.78	.58	.35	.57							
J—Vocabulary	.41	.65	.39	.64	.54	.41	.51	.72						
K—Mark Making	.45	.59	.65	.45	.29	.64	.24	.34	.38					
L—Form Matching	.58	.56	.47	.48	.62	.42	.56	.46	.45	.42				
M—Place	.20	.16	.32	.15	.21	.31	.19	.14	.09	.33	.24			
N—Turn	.25	.24	.39	.13	.20	.36	.16	.09	.12	.46	.27	.52		
O—Assemble	.28	.25	.34	.17	.22	.30	.23	.15	.15	.33	.27	.34	.38	
P—Disassemble	.35	.32	.39	.23	.24	.32	.22	.16	.13	.41	.33	.44	.43	.47

iors, including 44 boys and 56 girls, who were tested with Form A of B–1002 in Baltimore, Maryland, in 1952. Ages of individuals in the sample ranged from 16 to 19 years, with a mean of 17.5 years and a standard deviation of 0.7 years. Results are shown in Table 6–3.

Intercorrelations of the 12 tests of B–1002, Form A, range from—.13 to .62. There are numerous small negative intercorrelations between tests measuring cognitive and perceptual aptitudes (Tests 1–7) and tests of motor abilities (Tests 8–12). The median intercorrelation is .26.

Basic Airmen Sample

These results are from a study reported by McReynolds (1959). The sample consists of 2,649 airmen who were tested with Form B of B–1002 in 1958 during their basic training period at Lackland Air Force Base. Parts 9–12, which measure Aptitudes F and M, were not administered. Results are shown in Table 6–4.

Intercorrelations of the eight paper-and-pencil tests of B–1002 range from .16 (between Test 3 and Test 8) to .66 (between Tests 2 and 6, the tests measuring Numerical Aptitude). The median intercorrelation is .34.

INTERCORRELATIONS OF APTITUDE SCORES

The intercorrelations obtained for aptitudes also show some variation from one sample to another. The median intercorrelation among

Table 6–3. Intercorrelations of Tests in B–1002, Form A–N = 100 High School Seniors

Test	1	2	3	4	5	6	7	8	9	10	11
1—Name Comparison											
2—Computation	.41										
3—Three-Dimensional Space	.26	.22									
4—Vocabulary	.29	.31	.40								
5—Tool Matching	.62	.36	.45	.33							
6—Arithmetic Reason	.28	.51	.39	.45	.17						
7—Form Matching	.46	.38	.40	.26	.51	.36					
8—Mark Making	.29	.18	—.03	.14	.24	—.12	.32				
9—Place	.09	.02	—.10	—.01	.12	—.13	.18	.23			
10—Turn	.25	.18	—.13	.17	.30	—.05	.31	.58	.39		
11—Assemble	.14	—.06	—.02	.00	.18	—.08	.17	.29	.29	.36	
12—Disassemble	.23	.10	.07	—.10	.23	—.04	.34	.37	.34	.43	.28

Table 6–4. Intercorrelations of Tests in B–1002, Form B–N = 2,649 Basic Airmen

Test	1	2	3	4	5	6	7
1—Name Comparison							
2—Computation	.50						
3—Three-Dimensional Space	.27	.23					
4—Vocabulary	.38	.40	.34				
5—Tool Matching	.48	.33	.37	.22			
6—Arithmetic Reason	.39	.66	.29	.54	.26		
7—Form Matching	.38	.37	.47	.29	.48	.31	
8—Mark Making	.39	.35	.16	.25	.27	.28	.31

aptitudes in the five studies in this section is about .36. In general, the highest intercorrelations are among the cognitive abilities (Aptitudes G, V, N, and S), and the lowest correlations are between cognitive and motor abilities (Aptitudes A, T, K, F, and M). For example, in Table 6–6, the lowest correlation (—.06) is between Intelligence and Manual Dexterity, and the highest (.74) is between Numerical Aptitude and Intelligence. The lowest correlations in Tables 6–7 and 6–8 (.08 and .16, respectively) are between Spatial Aptitude and Motor Coordination.

Note the relatively high correlation (.81) between Aiming and Motor Speed in Table 6–5. The high correlation is due, in part, to the fact that Test K is a measure common to both these aptitudes. When the B–1002 edition of the GATB was developed, this overlapping was eliminated by substituting a single measure, designated as Motor Coordination, for Aiming and Motor Speed. (See Chapter 1 of this Section.)

The results from five studies on intercorrelation of GATB aptitude scores are summarized as follows:

Type of Sample	*Intercorrelations* Range	Median
Employed Workers (N=121)	.03 to .81	.29
High School Seniors (N=100)	—.06 to .74	.29
College Freshmen (N=1,607)	.08 to .77	.34
Basic Airmen (N=2,649) . . .	.16 to .78	.39
Occupational Validation (N = 23,428)	.10 to .86	.44

Employed Worker Sample

These results are from a study reported by Boulger (1952). The sample consists of 121 female workers (including 59 knitting mill workers, 27 tabulating machine operators, and 35 hand decorators) who were tested with B–1001. Results are shown in Table 6–5.

Intercorrelations of the 10 aptitudes of B–1001 range from .03 (between Aptitude V and Aptitude M) to .81 (between Aptitude A and Aptitude T). There are correlations of .78 and .76 between Aptitude G and Aptitudes V and N, respectively. The median intercorrelation is .29.

High School Senior Sample

This is the same sample of 100 high school seniors for which the intercorrelations of the tests of B–1002, Form A, are reported earlier in this chapter. Intercorrelations of the aptitude scores are shown in Table 6–6.

Intercorrelations of the nine aptitudes of B–1002 range from —.06 to .74. The three highest correlations are between Aptitude G and Aptitudes V, N, and S, the aptitudes measured by tests also used to measure Aptitude G.

Table 6–5. Intercorrelations of Aptitudes Measured by B–1001–N=121 Employed Workers

Aptitude	G	V	N	S	P	Q	A	T	F
G—Intelligence									
V—Verbal Aptitude	.78								
N—Numerical Aptitude	.76	.47							
S—Spatial Aptitude	.61	.30	.26						
P—Form Perception	.40	.22	.29	.49					
Q—Clerical Perception	.60	.61	.53	.20	.56				
A—Aiming	.36	.36	.36	.15	.39	.41			
T—Motor Speed	.29	.33	.24	.11	.37	.42	.81		
F—Finger Dexterity	.17	.18	.12	.19	.26	.27	.25	.26	
M—Manual Dexterity	.07	.03	.07	.12	.29	.12	.23	.21	.54

Table 6–6.–Intercorrelations of Aptitudes Measured by B–1002, Form A–N=100 High School Seniors

Aptitude	G	V	N	S	P	Q	K	F
G—Intelligence								
V—Verbal Aptitude	.73							
N—Numerical Aptitude	.74	.42						
S—Spatial Aptitude	.70	.40	.34					
P—Form Perception	.43	.34	.42	.48				
Q—Clerical Perception	.35	.29	.42	.26	.66			
K—Motor Coordination	—.04	.13	.06	—.03	.29	.29		
F—Finger Dexterity	—.05	—.03	—.03	.01	.27	.20	.37	
M—Manual Dexterity	—.06	.06	.01	—.03	.23	.16	.49	.46

The lowest correlations, sometimes negative, are between Aptitudes K, F, and M and Aptitudes G, V, N, and S. The median intercorrelation is .29.

College Freshmen Sample

This sample consists of 1,067 freshmen girls at Stephens College, Columbia, Missouri, who were tested with Form A of B–1002 in 1952. Parts 9–12, which measure Aptitudes F and M, were not administered. The results, shown in Table 6–7, were provided by Dr. Dorothy Pollock, Director of the Counseling Service at Stephens College in 1952, and are published here with her permission.

Intercorrelations of the seven aptitudes of B–1002 measured by the tests administered range from .08 to .77. As in the preceding study, the highest correlations are between Aptitude G and Aptitudes V, N, and S. The lowest correlation is between Aptitude K and Aptitude S; Aptitude K also has low correlations with most of the other aptitudes. The median intercorrelation is .34.

Basic Airmen Sample

This is the same sample of 2,649 airmen for which the intercorrelations of the tests of Form B of B–1002 are reported earlier in this chapter. Intercorrelations of the aptitude scores are shown in Table 6–8.

Intercorrelations of the seven aptitudes measured by the tests administered range from .16 (between Aptitude S and Aptitude K) to .78 (between Aptitude G and Aptitude N). Aptitude G also has high correlations with Aptitudes V and S. The median intercorrelation is .39.

Table 6–7. Intercorrelations of Aptitudes Measured by B–1002, Form A–N=1,067 College Freshmen

Aptitude	G	V	N	S	P	Q
G—Intelligence						
V—Verbal Aptitude	.77					
N—Numerical Aptitude	.74	.52				
S—Spatial Aptitude	.67	.34	.29			
P—Form Perception	.43	.27	.33	.46		
Q—Clerical Perception	.47	.42	.48	.26	.47	
K—Motor Coordination	.18	.15	.23	.08	.24	.31

Table 6–8. Intercorrelations of Aptitudes Measured by B–1002, Form B–N=2,649 Basic Airmen

Aptitude	G	V	N	S	P	Q
G—Intelligence						
V—Verbal Aptitude	.77					
N—Numerical Aptitude	.78	.50				
S—Spatial Aptitude	.62	.34	.28			
P—Form Perception	.43	.27	.39	.46		
Q—Clerical Perception	.45	.38	.50	.27	.52	
K—Motor Coordination	.31	.25	.35	.16	.32	.39

Occupational Validation Sample

This sample consists of 23,428 employed workers, applicants, apprentices, students and trainees tested as part of 367 occupational validation studies conducted between 1950 and 1966 (Hawk 1970). Results are shown in Table 6–9. Intercorrelations of the 9 aptitudes of B–1002 range from .10 (between Aptitude V and Aptitude M) to .86 (between Aptitude G and Aptitude N). The median intercorrelation is .44.

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Table 6–9. Means (M), Standard Deviations (S.D.) and Intercorrelations of Aptitudes in B–1002—N=23,428 Employed Workers, Applicants, Apprentices, Students and Trainees

Aptitude	M	S.D.	G	V	N	S	P	Q	K	F
G—Intelligence	100.0	18.5								
V—Verbal Aptitude	99.2	17.3	.84							
N—Numerical Aptitude	97.5	19.1	.86	.67						
S—Spatial Aptitude	101.4	20.0	.74	.46	.51					
P—Form Perception	100.2	19.7	.61	.47	.58	.59				
Q—Clerical Perception	101.8	17.6	.64	.62	.66	.39	.65			
K—Motor Coordination	102.1	18.7	.36	.37	.41	.20	.45	.51		
F—Finger Dexterity	98.7	20.2	.25	.17	.24	.29	.42	.32	.37	
M—Manual Dexterity	103.5	21.4	.19	.10	.21	.21	.37	.26	.46	.52

7. Derivation of Aptitude Scores

DERIVATION OF B–1001 APTITUDE SCORES

The identification of 10 aptitude factors underlying a wide variety of psychological tests, the selection of a battery of 15 tests for measuring these factors, and the development of general working population norms for the selected tests have been described elsewhere. (See Chapters 3 and 5 of this Section.) The derivation of standardized B–1001 aptitude scores, which requires the solution of problems in differential weighting of raw test scores and standardization of weighted composite scores, is described below.

Of the 10 aptitudes identified from the factor analysis studies, 8 are each measured by more than 1 of the 15 B–1001 tests. For each of these aptitudes, it was necessary to determine how the tests selected as measures of the aptitude should be weighted and combined so that the composite score would be the best possible available estimate of the aptitude factor. The problem does not differ essentially from that of determining the differential test weights which will provide maximum prediction of an occupational success criterion. In both cases an appropriate solution is obtained by applying multiple regression techniques to intercorrelations and validity coefficients of the tests. The one difference between the two cases is that in the prediction of occupational success the criterion is a concrete, objective measure, whereas in the estimation of an aptitude factor the criterion is only theoretical, and not directly measurable. However, this difference is of no practical importance, since the data necessary for a solution to the weighting problem through multiple regression analysis do not include objective measures of a criterion, but consists only of test intercorrelations and validity coefficients.

The factor loading of a test may be interpreted as the estimated correlation coefficient between the test and the underlying factor; as such, it may be considered as an estimate of the internal or factorial validity of the test with respect to the aptitude measured. The factor loadings of the 15 tests in B–1001 had been obtained from the factor analysis studies, and the intercorrelations of these tests were available for a sample of 519 employed workers. (See Chapters 3 and 6 of this Section.) The Wherry-Doolittle Test Selection Method is an appropriate multiple-regression technique for weighting tests measuring a given aptitude so that the composite score has maximum factorial validity. This method was applied to the intercorrelations and factor loadings of the tests for each of the eight aptitudes measured by more than one test.

The test weights found in a Wherry-Doolittle Solution are called β (Beta) coefficients; they indicate the relative contribution of the test to the composite aptitude score. The multiple factor loading is the estimated factoral-validity coefficient of the aptitude as measured by the composite scores; it indicates the extent to which the composite scores measure the theoretical aptitude. Since Aptitudes V and Q are each measured by a single test, the estimated factorial validities of scores on these aptitudes are the same as the factor loadings of the single tests from which the aptitude scores are obtained. Table 7–1 shows the 10 aptitudes identified from the factor analysis studies, the B–1001 tests selected for measuring each aptitude, the factor loadings and β coefficients of these tests, and the multiple factor loading for each aptitude.

The relative importance of two or more tests as contributors to the prediction of a given aptitude is indicated by the relative size of the β coefficients of these tests. For example, a comparison of the β coefficients for Tests F and H shows that the relative contribution of Test H to the prediction of Aptitude S is much greater than that of Test F. When applied to standard scores, β coefficients weight the tests selected as partial measures of a given aptitude in such a way that the weighted composite score provides the best available estimate of the underlying aptitude. Since differential weighting was not involved in the cases of Aptitudes V and Q, the single tests measuring these aptitudes were each assigned unit weight.

Test results are obtained in raw-score units which are not directly comparable from test to test as are standard-score units. Therefore, in order to obtain weights applicable for use with raw scores, it was necessary to adjust the β weights to take into account the differences in standard deviations of the raw scores on the various tests. This adjustment was made by dividing the β weight of each test by its standard deviation for the sample of 519 employed workers. The raw-score weights were then further adjusted and a constant added to the weighted scores for each aptitude so that the mean and standard deviation of the composite scores for each aptitude would be 100 and 20, respectively, for the sample of 519 employed workers. Table 7–2 shows the 10 aptitudes identified from the factor analysis studies, the B–1001 tests selected for measuring each aptitude, and the weights and constants of each test for converting raw scores to aptitude scores with a mean of 100 and a standard deviation of 20 for the sample of 519 employed workers.

APTITUDES MEASURED AND TESTS INCLUDED IN FORMS A AND B OF B–1002

The machine-scorable Forms A and B of B–1002 each contain 12 tests measuring 9 ap-

Table 7–1. The Ten Aptitudes Identified from the Factor Analysis Studies, the B–1001 Tests Selected as Measures of Each Aptitude, the Factor Loading and β Coefficients for These Tests, and the Multiple Factor Loading for Each Aptitude

Aptitude	Test	Factor Loading	β	Multiple Factor Loading
G—Intelligence	H—Three-Dimensional Space	.450	.171	.602
	I—Arithmetic Reason	.552	.306	
	J—Vocabulary	.513	.227	
V—Verbal Aptitude	J—Vocabulary	.533		.533
N—Numerical Aptitude	D—Computation	.483	.348	.500
	I—Arithmetic Reason	.438	.188	
S—Spatial Aptitude	F—Two-Dimensional Space	.397	.074	.503
	H—Three-Dimensional Space	.500	.446	
P—Form Perception	A—Tool Matching	.520	.403	.549
	L—Form Matching	.435	.211	
Q—Clerical Perception	B—Name Comparison	.627		.627
A—Aiming	C—H Markings	.473	.343	.506
	K—Mark Making	.423	.223	
T—Motor Speed	G—Speed	.709	.431	.780
	K—Mark Making	.708	.428	
F—Finger Dexterity	O—Assemble	.595	.469	.629
	P—Disassemble	.486	.239	
M—Manual Dexterity	M—Place	.628	.504	.662
	N—Turn	.500	.244	

Table 7–2. ***The 10 Aptitudes Identified from the Factor Analysis Studies, the B–1001 Tests Selected for Measuring Each Aptitude, and the Weights and Constants of Each Test for Converting Raw Scores to Aptitude Scores with a Mean of 100 and a Standard Deviation of 20—Employed Workers: N=519***

Aptitude	Test	Conversion Weight	Conversion Constant
G—Intelligence	H—Three-Dimensional Space	.828	42.500
	I—Arithmetic Reason	2.981	
	J—Vocabulary	.818	
V—Verbal Aptitude	J—Vocabulary	2.169	54.723
N—Numerical Aptitude	D—Computation	1.827	32.195
	I—Arithmetic Reason	2.207	
S—Spatial Aptitude	F—Two-Dimensional Space	.359	46.668
	H—Three-Dimensional Space	2.583	
P—Form Perception	A—Tool Matching	2.560	20.061
	L—Form Matching	.982	
Q—Clerical Perception	B—Name Comparison	.996	28.958
A—Aiming	C—H Markings	1.824	—44.590
	K—Mark Making	.904	
T—Motor Speed	G—Speed	.533	—52.257
	K—Mark Making	1.126	
F—Finger Dexterity	O—Assemble	3.250	—49.803
	P—Disassemble	2.080	
M—Manual Dexterity	M—Place	1.744	—139.529
	N—Turn	.851	

titudes. The two forms are comparable in the types of tests included and the nature of the aptitudes measured. They differ only in the specific sampling of items in Parts 1 through 7. The tests included in Forms A and B of B–1002 and the nine aptitudes measured by these tests are described in Chapter 4 of this Section. With the following exceptions, the content of Forms A and B of B–1002 is comparable to that of B–1001 in terms of both the type of tests included and the nature of the aptitudes measured.

1. Consolidation of Aptitudes A and T. Although the factor-analysis studies indicated that B–1001 Aptitudes A and T are independent, the separate measures of these aptitudes are not independent since Part K enters into the measurement of both aptitudes. Results from occupational research studies conducted with B–1001 have shown that the overlap in measurement caused by Part K is sufficiently large to make separate measures of Aptitudes A and T unnecessary. Further evidence of the overlapping of these two aptitudes was found in intercorrelation studies, where high correlations between Aptitudes A and T were obtained. (See Chapter 6 of this Section for intercorrelation data.) Therefore, in order to save administration time without a corresponding loss in effectiveness of aptitude measurement, it was decided to consolidate Aptitudes A and T into a single measure called "Aptitude K, Motor Coordination," thereby reducing the number of aptitudes measured by Forms A and B of B–1002 from 10 to 9.

2. Elimination of tests corresponding to B–1001 Parts C and G. Part 8, the B–1002 equivalent of Part K, was used as the single measure of Aptitude K because (1) this test was found from the factor analysis studies to

be a composite measure of B–1001 Aptitudes A and T, and, therefore, is a suitable measure of the composite Aptitude K and (2) the high reliability of this test justifies using it as a single measure. (See Chapter 15 of this Section for reliability data.) Tests corresponding to B–1001 Parts C and G, which had been used as partial measures of Aptitudes A and T, respectively, were not included in B–1002.

3. Elimination of test corresponding to B–1001 Part F. It was decided not to include in B–1002 a test of two-dimensional space corresponding to Part F of B–1001. This decision was made because (1) the relatively small additional contribution of Part F ($\beta = .07$) over that made by Part H ($\beta = .45$) to the measure of Spatial Aptitude did not warrant the additional administration time required, and (2) the reliability of Part 3, the three-dimensional space test of B–1002, was found to be sufficiently high to justify its use as a single measure.

The differences between B–1001 and Forms A and B of B–1002 in aptitudes measured and types of tests used for measuring the aptitudes are limited to those described above. B–1002 Parts 8, 9, 10, 11, and 12 are identical to corresponding B–1001 Parts K, M, N, O, and P; B–1002 Parts 1, 2, 3, 4, 5, 6, and 7 were designed to sample the same abilities measured by corresponding B–1001 Parts B, D, H, J, A, I, and L.

DERIVATION OF B–1002 (FORM A) APTITUDE SCORES

Conversion Studies

The purpose of the B–1001—B–1002 (Form A) comparability studies was to make it possible to standardize Form A of B–1002 on the General Working Population Sample (N = 4,000) for which only B–1001 data were available. In all, four studies on the relationship between the two forms of the GATB were conducted, each in a different State. In each study a sample of high school students (juniors and seniors) was obtained and divided into two groups equated for age, education, percent of males, and scholastic ability as closely as practicable. B–1001 and Form A of B–1002 were administered, in that order, to Group I. The order of administration was reversed for Group II. The data from one of the studies were discarded after analysis of variance tests showed that Groups I and II could not reasonably be considered comparable in this study. The remaining three studies were combined and means and standard deviations of first administration scores on B–1001 and Form A of B–1002 were computed separately for Group I (N = 320) and Group II (N = 265), respectively. On the basis of these statistics, linear equations were derived to obtain B–1001 equivalent scores from B–1002 (Form A) scores on Parts 1 through 7. Substitution of B–1002 (Form A) raw scores in these equations made it possible to obtain equivalent raw scores on B–1001. It was not necessary to derive equations for Parts 8 through 12 since these tests have identical counterparts in B–1001.

Differential Weighting and Standardization

Differential weighting of tests was required for each of the five aptitudes measured by more than one test in Form A of B–1002. The B–1002 (Form A) tests measuring each of these aptitudes were weighted according to the β coefficients obtained for the corresponding tests in B–1001. By using this differential weighting procedure, the relative contribution of each B–1002 (Form A) test to the B–1002 aptitude score is equivalent to that of the corresponding B–1001 test to the B–1001 aptitude score. Since such differential weighting was not involved in the cases of the remaining four aptitudes, the single tests measuring these aptitudes were each assigned unit weight. In order to obtain weights applicable for use with B–1001-equivalent raw scores obtained by substituting B–1002 (Form A) scores in the equations obtained from the conversion studies, the β weight for each B–1002 (Form A) test was divided by the standard deviation of its B–1001 counterpart for the General Working Population Sample (N = 4,000). A final adjustment was made in the weights and a constant was added to the weighted scores for each aptitude so that the (derived) mean and standard deviation of the composite scores for each aptitude would be 100 and 20, respectively, for the General Working Population Sample (N=4,000). Table 7–3 shows the 9 aptitudes measured by Form A of B–1002, the tests selected for measuring each aptitude, and the weights and constants of each test for converting raw scores to aptitude scores with a (derived) mean of 100 and a (derived) standard deviation of 20 for the General Working Population Sample of 4,000 employed workers. The conversion tables are shown in Section I of the *Manual for the GATB.*

DERIVATION OF B–1002 (FORM B) APTITUDE SCORES

Three studies on the relationship between Form A and Form B of B–1002 were conducted, each in a different State. In each study a sample of high school students (juniors and seniors) was obtained and divided into two equal groups equated for age, education, percent of males, and scholastic ability as closely as practicable. Form A and Form B were administered, in that order, to Group I. The order of administration was reversed for Group II. The data from one of the studies were discarded after analysis of variance tests showed that Groups I and II could not reasonably be considered comparable in this study. The remaining two studies were combined and and means and standard deviations of first administration scores on Form A and Form B were computed separately for Group I (N=206) and Group II (N=206), respectively. On the basis of these statistics linear equations were derived to obtain Form A equivalent scores from Form B scores on Parts 1 through 7. The aptitude score(s) corresponding to each raw score on Form B Parts 1 through 7 and obtained by (1) substituting the Form B raw score in the appropriate Form B —Form A test conversion equation(s), (2) solving for the Form A equivalent score, and (3) noting the Form A aptitude score(s) derived for this raw score. The tables for converting raw scores on Form B tests to aptitude scores are shown in Section I of the *Manual for the GATB.*

Table 7–3. The 9 Aptitudes Measured by Form A of B–1002, the Tests Selected for Measuring Each Aptitude, and the Weights and Constants of Each Test for Converting Raw Scores to Aptitude Scores with a Derived Mean of 100 and a Derived Standard Deviation of 20—General Working Population Sample: N= 4,000

Aptitude	Test	Conversion Weight	Conversion Constant
G—Intelligence	3—Three-Dimensional Space	.932	.710
	6—Arithmetic Reason	2.397	—.033
	4—Vocabulary	.737	43.349
V—Verbal Aptitude	4—Vocabulary	1.954	60.630
N—Numerical Aptitude	2—Computation	1.987	32.197
	6—Arithmetic Reason	1.773	—.025
S—Spatial Aptitude	3—Three-Dimensional Space	3.278	48.203
P—Form Perception	5—Tool Matching	1.981	—8.480
	7—Form Matching	1.080	20.025
Q—Clerical Perception	1—Name Comparison	1.118	47.802
K—Motor Coordination	8—Mark Making	1.938	—34.629
F—Finger Dexterity	11—Assemble	3.271	—52.761
	12—Disassemble	2.036	
M—Manual Dexterity	9—Place	1.767	—135.804
	10—Turn	.765	

MODIFICATION OF B–1001

To increase the comparability of the B–1001 and B–1002 editions of the GATB, the following modifications were made in 1966 in the content and standardization of the B–1001 edition:

1. B–1001 Parts C (H Markings), F (Two-Dimensional Space) and G (Speed), which do not have B–1002 counterparts, were dropped. As pointed out earlier in this Chapter, under the heading "Aptitudes Measured and Tests Included in Forms A and B of B–1002," these three tests make little or no contribution to the effective measurement of the aptitudes covered by the GATB. Thus, eliminating them from the B–1001 edition shortens administration time and increases comparability with the B–1002 edition.
2. The conversion weights and constants for raw scores were modified to provide for standardization on the General Working Population Sample (N = 4,000).

The linear equations for converting raw scores on each test to aptitude scores are based on the weights and constants shown opposite each test in Table 7–4. The conversion tables are shown in Section I of the *Manual for the GATB.*

IBM 805—NCS ANSWER SHEET COMPARABILITY STUDY

National Computer Systems has developed an automated scoring system for the GATB which performs all scoring, converting and recording operations automatically. This scoring system utilizes an optical scanner-computer complex to score answer sheets and print a Test Record Card and Presscore (pressure sensitive label), each containing name and identification information, GATB raw scores (Test Record Card only) and aptitude scores, and identification of the Occupational Aptitude Patterns passed.

The NCS answer sheet for the GATB, designed to permit automated scoring, differs in a number of respects from the IBM 805 an-

Table 7–4. The 9 Aptitudes Measured by the 1966 Modification of B–1001, the Tests Selected for Measuring Each Aptitude, and the Weights and Constants of Each Test for Converting Raw Scores to Aptitude Scores with a Mean of 100 and a Standard Deviation of 20—General Working Population Sample: N=4,000

Aptitude	Test	Conversion Weight	Conversion Constant
G—Intelligence	H—Three-Dimensional Space	.812	
	I—Arithmetic Reason	2.668	
	J—Vocabulary	.802	40.963
V—Verbal Aptitude	J—Vocabulary	2.127	54.305
N—Numerical Aptitude	D—Computation	1.715	32.368
	I—Arithmetic Reason	1.974	
S—Spatial Aptitude	H—Three-Dimensional Space	2.857	45.704
P—Form Perception	A—Tool Matching	2.400	
	L—Form Matching	.952	21.996
Q—Clerical Perception	B—Name Comparison	.904	36.098
K—Motor Coordination	K—Mark Making	1.938	—34.629
F—Finger Dexterity	O—Assemble	3.271	—52.761
	P—Disassemble	2.036	
M—Manual Dexterity	M—Place	1.767	—135.804
	N—Turn	.765	

swer sheets for the GATB. Response positions for Parts 1–7 of the GATB, B–1002 are arranged on two sides of a single 17" x 11" NCS answer sheet (folded to 8½" x 11"), compared to the four sides of two 9" x 11" IBM answer sheets. Responses are made on the NCS answer sheet by darkening circles; responses are made on the IBM answer sheets by darkening rectangular spaces. Since differences in answer sheet design may be accompanied by corresponding differences in score levels, the comparability of scores on IBM and NCS answer sheets for Parts 1–7, of the GATB, B–1002 was determined by the following research, conducted during the period September 1963–January 1964 in Louisiana and Ohio.

Sample

The GATB, B–1002B was administered to a group of tenth graders in Louisiana and Ohio high schools to which the GATB was released. The GATB, B–1002A was administered to a group of high school seniors tested by the Louisiana and Ohio State Employment Services under the cooperative school program. Students in each of these groups were tested with IBM and NCS answer sheets. Comparable samples in each group were obtained by using the following procedure prior to each classroom test administration. An alphabetical listing of the surnames of the students who would be tested was obtained; these names were separated into two groups, males and females; rank-order numbers were assigned to the students in each group; all even numbered students, male and female, were administered the GATB with IBM answer sheets, all odd numbered students used the NCS answer sheet. The number of students in each group tested with IBM and NCS answer sheets is as follows:

GATB Answer Sheet	Tenth Graders (GATB, B–1002B)	High School Seniors (GATB, B–1002A)
IBM	302	433
NCS	295	438

Results

The means and standard deviations for raw scores made on IBM and NCS answer sheets for (1) Parts 1–7 of the GATB, B–1002A, and (2) Parts 1–6 of the GATB, B–1002B (NCS scores on Form B, Part 7 were considered invalid because of printing errors in the answer sheet) are shown in Table 7–5.

Two types of tests were made of the statistical significance of the difference between raw scores on the IBM and NCS answer sheets for (1) Parts 1–7 of the GATB, B–1002A, and (2) Parts 1–6 of the GATB, B–1002B (since NCS scores on Form B, Part 7 were considered invalid because of printing errors in the answer sheet, tests of significance were not made using these scores):

1. The significance of the difference between mean scores on the two types of answer sheets was determined using the *t* test. This test provides an indication as to whether the average level of performance differs on the two types of answer sheets.

2. The significance of the difference between score distributions on the two types of answer sheets was determined using the Kolmogorov-Smirnov two-sample test. This test provides an indication as to whether the two distributions differ in any way.

Table 7–6 shows the results of these statistical tests of significance.

The results in Table 7–6 indicate that adjustments were required for raw scores on Parts 1, 2, 5 and 7 on the NCS answer sheet to make them comparable to scores on IBM answer sheets. Plots were made of equi-percentile points for the distribution of scores on NCS and IBM answer sheets for Parts 1, 2, 5 and 7 of the GATB, B–1002A. The standard score line was a good fit for the equi-percentile points for Part 1; therefore, the standard score line was used to determine the adjustments for this Part. The standard score line was not a good fit for the equi-percentile points for Parts 2, 5 and 7, so a curve drawn to best fit the points for each of these Parts was used to determine the adjustments.

Adjustments for the NCS answer sheet for the GATB, B–1002A were made by reading from the lines of best fit. Adjustments are ex-

Table 7–5. Comparability Data for the Two Samples

GATB Part	GATB, B–1002A				GATB, B–1002B			
	Type of Answer Sheet				Type of Answer Sheet			
	IBM 805		NCS		IBM 805		NCS	
	M	S. D.	M	S. D.	M	S. D.	M	S. D.
1	52.2	12.0	44.5	11.0	45.6	10.4	39.9	8.4
2	25.8	5.1	25.0	4.7	23.0	3.8	22.3	3.8
3	16.5	5.7	16.0	5.0	17.7	5.8	17.8	5.2
4	18.4	6.8	18.0	6.1	16.9	6.2	16.6	5.6
5	32.9	5.9	30.2	5.6	31.1	5.9	28.4	5.5
6	11.5	3.4	11.7	3.2	10.9	2.7	10.8	2.5
7	27.9	5.6	25.5	5.4	27.0	5.7	....	...

pressed in terms of the ranges of raw scores on the NCS answer sheet for which a particular raw score adjustment should be made. Adjustments for the NCS answer sheet for the GATB, B–1002B were made by converting the ranges for Form A to their Form B equivalents. The score adjustments for the NCS answer sheet for Forms A and B of the GATB, B–1002, are shown in Table 7–7.

Verification of Results

The GATB, B–1002B score adjustments shown in Table 7–7 for Parts 1, 2 and 5 were applied to the GATB, B–1002B raw scores made on the NCS answer sheet by tenth graders in Louisiana and Ohio high schools. (Since GATB, B–1002B, Part 7 scores made on the NCS answer sheet were considered invalid be-

Table 7–6. Results of Statistical Tests of Significance

GATB Part	GATB, B–1002A		GATB, B–1002B	
	Level of Significance of Difference Between—		Level of Significance of Difference Between—	
	Means	Distributions	Means	Distributions
1	.01 level	.001 level	.01 level	.001 level
2	.05 level	Not sig.	.05 level	Not sig.
3	Not sig.	Not sig.	Not sig.	Not sig.
4	Not sig.	Not sig.	Not sig.	Not sig.
5	.01 level	.001 level	.01 level	.001 level
6	Not sig.	Not sig.	Not sig.	Not sig.
7	.01 level	.001 level	....	....

Table 7–7. Adjustments of Scores on NCS Answer Sheet

	GATB, B–1002		Adjustment
	Form A	Form B	
Part 1	0–7	0–8	Add 4 points
	8–18	9–18	Add 5 points
	19–29	19–28	Add 6 points
	30–40	29–38	Add 7 points
	41–52	39–48	Add 8 points
	53–64	49–59	Add 9 points
	65–75	60–69	Add 10 points
	76–86	70–79	Add 11 points
	87–97	80–89	Add 12 points
	98–108	90–98	Add 13 points
	109–119	99–108	Add 14 points
	120–130	109–118	Add 15 points
	131–134	119–134	Add 16 points
	135–150	135–150	Convert to 150
Part 2	0–19	0–18	No change
	20–49	19–49	Add 1 point
	50	50	No change
Part 5	0–5	0–6	No change
	6–17	7–17	Add 1 point
	18–30	18–28	Add 2 points
	31–43	29–40	Add 3 points
	44–45	41–45	Add 4 points
	46–49	46–49	Convert to 49
Part 7	0–10	0–9	Add 1 point
	11–29	10–27	Add 2 points
	30–57	28–57	Add 3 points
	58–60	58–60	Convert to 60

cause of printing errors in the answer sheet, score adjustments were not applied to these scores.) Computation of the statistical significance of the difference between (1) means, and (2) score distributions for IBM raw scores and *adjusted* NCS raw scores for Parts 1, 2 and 5 of the GATB, B–1002B showed no significant differences.

Application of Results

The score adjustments shown in Table 7–7 have been built into the NCS scoring program whether the tests are scored by hand or by machine.

IBM 805–1230 ANSWER SHEET COMPARABILITY STUDY

The Utah Test Development Field Center in cooperation with the IBM Corporation developed an answer sheet for the GATB, B–1002 which was designed for use on the 1230 series optical scanner. The 1230 answer sheet consists of a booklet of six sheets which are perforated on the left side. The perforated portion is torn off and the booklets are separated for scoring. Each page is pre-coded with a machine-readable identification number and the form, either A or B. To further identify the A

Table 7–8. Number of Subjects Used to Analyze Mean Differences in Scores Earned on IBM 805 or 1230 Answer Sheets

State	Grade	GATB, B-1002				Total
		FORM A		FORM B		
		IBM 805	IBM 1230	IBM 805	IBM 1230	
Utah	9	145	144	142	145	576
Texas	10	129	135	117	132	513
Michigan	11	96	99	87	100	382
California	12	125	132	127	135	519
Total N		495	510	473	512	1990

and B form answer sheets, they are printed in different colors. The first page has provisions for entering the name, sex, years of education, group designation, Social Security Number, and scores for parts 8–12 of the GATB in machine-readable form. Only one side of each page is used.

Sample

The GATB B–1002 (form A or B) was administered during the 1968–69 school year to a total sample 1,990 students from Utah, Texas, Michigan and California (see Table 7–8). The range of grades (9–12) insured that a wide range of scores would be obtained, and the geographical distribution was deemed sufficient to minimize the possibility of regional differences biasing the results. Each State was instructed to obtain its sample from at least two schools representing different socio-economic levels to minimize the risk of socio-economic factors influencing the results. Within each school, or class if classes were tested separately, the students were separated by sex, alphabetized by surname, and randomly assigned to one of the four experimental groups.

Results

A three-way analysis of variance (Form X Sheet X Grade) was completed on GATB scores earned on either Form A or B, by students in Grades 9, 10, 11 or 12. Students used either the older IBM 805 answer sheet or the new IBM 1230 answer sheet. The analyses which were done separately for Parts 1–7 indicated that there were, for the most part, no differences between the mean scores of students using different answer sheets. The only significant difference between sheets occurred on Part 5. The probability that the two mean scores (1230 and 805) on Part 5 were equal was less than .0007. This was so conclusive that further statistical analyses, e.g., K–S Test, seemed unnecessary. The Part 5 sections on the answer sheet differ in the spacing of the

Table 7–9. Adjustment of B--1002 Scores on Part 5 of the IBM Answer Sheets

IBM 1230 Raw Score	Adjustment to Equate to IBM 805 Raw Score
1–22	None
23–41	Subtract 1 point
42–49	Subtract 2 points

item answers, i.e., the 805 (which had a lower mean score) has a double space between the answers occurring at the middle of the 805 answer sheet; the 1230 has a double space between the answers which coincide with different pages in the test booklet. This spacing on the 1230 may be the reason higher scores on Part 5 are earned. Since the statistical and logical analyses upheld the conclusion that there was a real difference between mean scores on this part, a linear conversion formula was generated. Since neither grade nor form affected the amount of difference found on Part 5, only one conversion formula was needed. This formula was applied to Part 5 raw scores on the 1230 answer sheet in order to equate them to Part 5 scores on the 805 answer sheet (see Table 7–9).

8. Development of Norms for Specific Occupations

USES aptitude tests were designed to measure capacities to learn various jobs. Although such measuring devices are already in use in the Employment Service for a large variety of occupations, there are many occupational areas not yet covered. When a need occurs for tests for one of these occupations, a measuring device is developed to meet that need. The State Employment Services gather the data in cooperation with employers, colleges, and schools and transmit the data to the national office. The data from the various State agencies are consolidated and occupational norms for the use of all the State agencies are issued. The national office integrates the occupational norms into the Occupational Aptitude Pattern structure, continually adding occupations to the occupational families already established, revising the composition of the families, and adding new Occupational Aptitude Patterns. The basic problem is to determine the aptitudinal requirements for a particular occupation. The process of developing aptitude norms for an occupation involves several steps, which are described briefly in this chapter. The complete test development procedures appear in the *Test Development Guide* (U.S. Department of Labor, Manpower Administration, 1969).

JOB ANALYSIS

The first step is an analysis of the job to obtain information concerning the duties performed by workers in the occupation and to identify the job properly. Particular attention is paid to the worker characteristics involved in performing the job so that estimates of aptitudes required to perform the job can be made. These judgments are considered along with statistical evidence in deciding which aptitudes should be considered for inclusion in the final test norms. If the majority of the aptitude raters, based upon actual observation of the job or reading of a carefully prepared job analysis schedule, believe that an aptitude is important to job performance, the aptitude is considered for inclusion in the final test norms if there is corroborating statistical evidence. If the raters believe that an aptitude is critical to job performance the aptitude is considered for inclusion in the final test norms even if there is no corroborating statistical evidence. On the other hand, if a majority of the raters believe that an aptitude is irrelevant to job performance, the aptitude is not considered for inclusion in the final test norms regardless of statistical considerations. Because of the difficulty many raters encounter in trying to determine whether the perception factor in a job is Aptitude P or Aptitude Q, certain limitations are imposed on the rating of these aptitudes. If one of these aptitudes is rated as being important or critical to job performance, the other may not be rated as being irrelevant. Likewise, if one of these aptitudes is rated as irrelevant, the other may not be rated as important or critical.

CRITERION

The next step is the determination of a suitable and reliable criterion, or measure of job success, with which test scores can be compared.

Determination of Criterion

Since a suitable criterion is essential to the successful conduct of a test development study, the availability of the needed criterion, or measure of job performance, is determined early in the process. The criterion is used to determine the extent to which the aptitude tests are related to job performance and, therefore, a criterion must be such that measures of aptitude can show some relationship to it. Thus, for aptitude test development purposes, it is important that the criterion be a measure of an important phase of the job which involves the essential job performance abilities, rather than a measure of general job success. For example, although factors such as cooperativeness, dependability, ability to get along with others, and diligence are important determinants of general job success, these factors are not measured by aptitude tests and should not be reflected in a criterion to be used for aptitude test development purposes. A suitable criterion for aptitude test development purposes should be a reliable and valid measure of each worker's job proficiency with respect to quantity and quality of production; it should be a good measure of the performance that we wish to predict with aptitude tests.

Types of Criteria

In broad terms, criteria can be classified into two main categories: objective and subjective. An objective criterion is a quantitative measure of quantity and/or quality of production. "Production Records" is a general term used to denote a variety of objective criteria. The actual records may be expressed as units produced, percent of production standard achieved, piece-rate earnings, or some other comparable measure to reflect quantity of production; or they may be expressed in terms of the number of errors made or the number of items rejected to reflect quality of production. Sometimes the two types of records may be combined statistically to obtain a single measure of both the quality and quantity of production for each worker. In addition to production records, work samples, such as proficiency tests in typing and stenography, may be used as objective criteria. It is possible to obtain separate or combined measures of speed and accuracy with work-sample criteria.

Subjective criteria involve a judgment of performance, usually made by somebody who is in a good position to rate the performance of each individual in the sample, such as a foreman, supervisor, or instructor. The rating technique might involve one of a variety of procedures such as broad category or group ratings, rank-order ratings, paired comparison ratings which yield a rank-order distribution, or the use of a descriptive rating scale. Regardless of the type of rating procedure employed, the objective is to place each individual in the experimental sample in the correct relative position with respect to his job performance ability.

School grades are also used as criteria for some test development studies. These may be primarily objective or to a large extent subjective, depending upon the grading system used in the school. For example, school grades would be objective if the final grades for each course were based solely upon examination marks made by the students. However, school grades become relatively subjective when an instructor uses the examination marks as a guide and assigns final grades in accordance with his judgment of each student's total performance.

Even though it has been customary to classify criteria as either "objective" or "subjective," there seldom is a clear-cut line between these two types of criteria. There often is an element of subjectivity in a criterion that is expressed in units which appear to be completely objective. It has been pointed out that school grades may be based in part on objective measurement and still involve a high degree of subjectivity. The same is true of production records. For example, when records of the number of rejects are employed to evaluate the quality of workers' performance, the criterion appears to be completely objective. However, there are subjective factors involved in setting the standards of acceptability for the items being produced, as well as in the evaluation of finished products in terms of the established standards to determine if they should be accepted or rejected. In this instance, although the criterion itself is expressed in units that appear to be objective measures, the underlying factors which determine the manner in which the units are derived are subjective. Similarly, there are subjective elements involved in criteria based on quantity of production. Subjective determinations are made of factors such as the method of measuring quantity of production and the rate of production considered to be satisfactory.

At one time objective criteria were generally regarded as more dependable measures of job performance than subjective criteria. In the early years of the Employment Service test development program, attempts were made to use only objective criteria for test development purposes. However, objective criteria were not available for many occupations, and for many jobs for which objective criteria were available, it was not possible to obtain comparable measures on samples of sufficient size for test development purposes. It was also found that objective criteria usually covered only one facet of job performance, such as quantity of production. These factors led to the use of subjective criteria in test development studies. Experience has since shown that it is often advisable to obtain both objective and subjective criterion data for the same sample. Each criterion correlated separately with the test scores can contribute data for meaningful interpretation. In a test development study on the occupation of Paster, a job in the production of ceramic products, both production records and supervisory ratings were obtained as criteria. The production records showed significant correlations with measures of manual dexterity and motor speed, whereas the supervisory ratings showed significant correlations with measures of form perception as well as with measures of manual dexterity and motor speed. Further study showed that the production records were based solely on quantity of production whereas the supervisory ratings reflected both quantity and quality of production. The job analysis data indicated that, although form perception was involved in quality of production, it was not a determinant of quantity. In this instance the subjective criterion data not only served to substantiate the findings of the objective criterion, but also revealed a significant relationship between job performance and measures of form perception that could not have been made evident through use of the objective criterion alone. On the basis of experiences similar to this one it appears that we should not generalize as to the superiority of one type of criterion over another. Both objective and subjective criteria have their specific uses. When both types of criterion data are available, the choice to lean more heavily on either one or to make equal use of both for purposes of test validation must necessarily depend on pertinent factors in the specific situation.

It is desirable to obtain measures of various pertinent aspects of the performance of a sample, even if the same general type of criterion data is used to measure the different aspects of performance. For example, in a study to develop GATB norms on a sample of dentistry students two criteria were obtained: honor point ratios for lecture course work and honor point ratios for laboratory course work. The analysis of data based on each type of criterion yielded different combinations of significant aptitudes. Since proficiency in both laboratory and lecture work is required for a student's successful completion of the course in dentistry, the norms established included aptitudes found to be significantly related to each criterion. This technique was also employed in a study on a sample of proofreaders for whom both speed and accuracy criterion measures were available. (See Chapter 9 of this Section.)

Quality of Criterion

The success or failure of a test development study can depend on the quality of the criterion. Therefore, it is important to evaluate the criterion data in every way possible. It is important that the criterion for a test development study be primarily a measure of each worker's job proficiency and that other determinants of general job success, such as cooperativeness and dependability, be excluded from this criterion. Data should be collected which enable a statistical evaluation of the reliability and validity of the criterion. The reliability of a criterion can be evaluated by obtaining two or more sets of criterion data covering different periods of time and correlating them, or by correlating the ratings of the same people made by different supervisors or foremen.

The validity of the criterion usually can be measured only indirectly. For example, we can determine the extent to which factors other than job performance might be influencing the criterion. Significant correlations between the criterion and variables such as experience, age, and education sometimes indicate that the criterion is not a true measure of job performance. In some instances, it might be possible to apply a statistical correction to nullify the effects of these extraneous factors. Or this objective might be achieved by applying some type of experimental control, such as excluding from the sample those individuals at the extremes of the distribution of the variable that is unduly influencing the criterion. For example, if an analysis of the data reveals that length of experience on the job has biased the job performance ratings assigned to workers, the experience factor can be held relatively constant by excluding from the sample those workers who have either extremely high or low amounts of experience relative to the other workers in the sample. Sometimes, however, no statistical correction or experimental control technique is applicable, and we either have to discard the criterion or use it with caution and interpret our results with reservations.

In some instances, a criterion may be a valid measure of job performance even though it does have significant correlations with such variables as age, experience, and education. It is difficult to determine when these correlations indicate spurious relationships and when they indicate true relationships. Every effort should be made to obtain as much information as possible which might enable a meaningful interpretation of the obtained relationships. For example, in a particular experimental sample the workers who have been on the job longer may actually be the best performers or they may have been given the higher ratings only because the supervisor is better acquainted with them. Sometimes a thorough examination of the experience and criterion data may yield some meaningful clues. The observation that none, or very few, of the less experienced workers have been placed in the high part of the criterion distribution might indicate that the ratings are biased. If all workers in the sample have completed the training period, and there has been no significant change in the labor market or company hiring procedures between the time that the more and less experienced workers were hired, it is unlikely that there would really be a marked preponderance of proficiency among the more experienced workers.

It is important to make certain that objective criterion data are comparable for all workers. Production records are considered a good criterion of proficiency if each worker has an equal opportunity to produce as many units as he can and production is measured uniformly for all workers. If, because of the nature of the job, the flow of work is subject to fluctuations, or if a machine controls the speed of production, production records would not be a suitable criterion. Factors such as lighting, age of machines, availability of materials, and additional duties performed by workers must be taken into consideration when the use of production records as a criterion is contemplated.

Treatment of Criterion Data

In order to use the criterion for statistical analysis, it is necessary for the data to be in a form which enables us to determine the relationships between the criterion and test performance. Usually objective criteria are expressed in units already forming continuous distributions and can be readily correlated with the test results. Sometimes, for convenience of computation, conversion of the units is desirable.

Subjective criterion data usually requires conversion to a form in which it may be correlated with the test results. For example, rank-order ratings place each individual in his relative position but space each person an equal distance from the next. Since job performance tends to be normally distributed, the ranks are converted to normalized scores. Items on a descriptive rating scale are usually weighted and summed to obtain a numerical score for each person in the experimental sample. Broad category or group ratings, which might merely designate each worker in the sample as either above average, average, or below average, are converted to quantitative values on the basis of the normal distribution curve. These data can then be used to compute product-moment correlation coefficients corrected for broad categories. When ratings are expressed in two categories, such as satisfactory or unsatisfactory, biserial correlation coefficients can be computed.

Since norms on Employment Service test batteries are established for use with the multiple cutoff method a technique which enables the correlation of dichotomously expressed variables is employed to evaluate the norms. The criterion, regardless of its original units, is also dichotomized and phi coefficients are computed. The question arises as to the point at which the criterion should be dichotomized.

When the criterion is to be dichotomized, it is desirable to find the "true" point of demarcation between satisfactory and unsatisfactory workers. This point is not constant for all groups but varies from one study to another. Factors such as the composition of an experimental sample, labor market conditions, production requirements of a particular plant, caliber of supervisory personnel, training techniques and production methods are important determinants of the proportion of the sample to be placed in the low criterion group. To make the best determination of the point of dichotomy, it is necessary to consult with the foreman, supervisors, or instructors who are familiar with the performance of everybody in the sample and are in the best position to specify where the point of demarcation between satisfactory and unsatisfactory performance falls.

In some instances determination of the division point between the high and low criterion groups might be facilitated by the availability of production records and knowledge that performance below a specified level of production is regarded as unsatisfactory by the company. For example, in the study which resulted in the S–60 norms for Pairer (hosiery) 684.687 the company indicated that the performance of workers who paired less than 10 dozen stockings per hour was not satisfactory. Therefore, all workers who paired less than 10 dozen stockings per hour were placed in the low criterion group. Another situation in which determination of the point of dichotomy might be facilitated is when the sample consists of students, the criterion is school grades, and there are specified performance requirements with respect to school grades. For example, in the study which resulted in the S–54 norms for Dental Hygienist 078.360, a grade point average of 3.0 was used as the cutting score for dichotomizing the criterion because an average of 3.0 was required for graduation as a dental hygienist.

Another example where the determination of the point of dichotomy was facilitated is in the study which resulted in the S–384 norms for Medical Laboratory Assistant (medical ser.) 078.381. In this study the criterion used was grades on the certification examination administered by the Board of Certified Laboratory Assistants of the American Society of Clinical Pathologists. (A passing score on this examination or a comparable State examination is required for certification.) The point of dichotomy was set at the approximate passing score on the certification examination.

When objective criterion data and quantitative performance standards are not available, it is necessary to rely on the judgment of foremen, supervisors, or instructors to determine the division point between satisfactory and unsatisfactory workers, trainees, or students. It is often difficult for this determination to be made even by foremen or supervisors who are thoroughly familiar with the performance of everybody in the experimental sample. In some samples, where there has already been some restriction in the range of ability, there may not be a true "unsatisfactory" or low criterion group. This would usually tend to be true for groups of college seniors or samples of experienced workers which include only those individuals who have demonstrated satisfactory performance, and from which those people who have not performed satisfactorily have dropped out. For samples of this type, in which everybody exhibits satisfactory performance, it is necessary to establish high and low criterion groups on a relative basis by setting a criterion critical score at some arbitrary point which divides the more proficient from the less proficient people in the sample. In such instances, the foreman or supervisor is asked to divide the sample into a group of better and a group of poorer workers on a relative basis so that the group of poorer workers will include between 25 and 40 per cent of the experimental sample. He is asked to make this division at whatever point within the specified range (25 to 40 percent) is deemed in his judgment to be most appropriate. An arbitrary point of dichotomy which places between 25 and 40 percent of the sample in the low criterion group is set by the foreman or supervisor only when there is no known "true" point of demarcation between satisfactory and unsatisfactory workers. Sometimes a foreman or supervisor may be unable or reluctant to divide the sample arbitrarily into groups of better and poorer workers on a relative basis as described above. In such instances, the individual collecting the research data suggests that the division point be set so that as close as possible to one-third of the sample is placed in the low criterion group and asks the foreman or supervisor if he concurs. If he does concur, as close as possible to one-third of the sample is placed in the low criterion group; if he does not concur, the foreman or supervisor is asked why not and the reason given might help to determine a more appropriate form of dichotomy.

When two criteria are used separately for computing zero order correlations in a test development study, the two measures are combined by establishing a multiple-hurdle criterion to evaluate the selective efficiency of test norms by means of the phi coefficient technique. A multiple-hurdle criterion is established by setting a critical score on each criterion to divide the sample into high and low criterion groups; an individual must equal or exceed *both* critical scores in order to be placed in the high criterion group. For example, in studies on samples of apprentices measures of theory or knowledge and measures of workshop performance are often correlated separately with each aptitude. In such studies, only those apprentices in the sample who equal or exceed the critical score on knowledge or theory *and* on workshop performance are placed in the high criterion group when the selective efficiency of test norms is evaluated. This insures that only those apprentices who meet the minimum proficiency requirements on both aspects of performance are placed in the high criterion group.

EXPERIMENTAL BATTERY

After a suitable and reliable criterion has been obtained, the next step is to select the experimental battery. When the test research program began in 1935, about 15 suitable tests were selected for tryout in a particular study after inspecting the job analysis information to see what abilities might be involved and considering the results of previous studies of the same or a similar occupation. Over a period of time a large number of tests were constructed, and by a process of factor analysis, it was found that they grouped themselves into 10 families or groups of tests measuring 10 significant vocational abilities. (See Chapter 3 of this Section.) Fifteen tests were selected which provided a good measure of all 10 of these abilities. These constituted the first edition of the GATB, B–1001. From 1945 to 1952, B–1001 was used as the standard experimental battery in every test development study undertaken to develop occupational norms (See Chapters 1 and 3 of this Section.) However, in the fall of 1952 another edition of the GATB, the separate-answer-sheet form, B–1002, was introduced to the State Employment Services for use in operational activities and test development studies. This battery consists of 12 tests measuring 9 aptitudes. (See Chapter 4 of this Section.) The entire GATB, B–1002, is usually administered to every experimental sample.

EXPERIMENTAL SAMPLE

In test development studies, the sample may consist of applicants, employees, trainees, apprentices, or students. The objective is to have a sample which is truly representative of the population from which it is drawn, and selected without bias in regard to the proficiency of individuals comprising the sample. It is desirable to include in the experimental sample all the people in the occupation being studied who meet the requirements with respect to factors such as job duties performed, age, education, experience, criterion of job performance, and availability for testing. As the size of the sample increases, the dependability of the statistics computed on the basis of the sample increases.

When a sample of employed workers is tested for test development purposes, it is desirable for the final sample to include at least

50, preferably more, workers who are all performing the same kind of work and who have survived the training period on the job. It is recognized that some plants may not have as many as 50 workers all performing the same job duties, or perhaps the management cannot see its way clear to make all the workers on a particular job available for experimental testing because this would interfere too much with the plant's production. In such instances the study is conducted on a sample of fewer than 50 workers in one State and combined with samples from other State agencies in order to arrive at a set of norms. Examples of such interstate research are the studies which resulted in the S–369 norms for Printer-Slotter Operator (paper goods) 651.782 and the S–358 norms for Offset-Duplicating-Machine Operator (clerical) 207.782. When there are between thirty and fifty workers available and interstate research is not practical, "plant" norms may be established. Norms are never established on samples of less than 30 workers. Experience in conducting experimental studies has shown that, after the data are collected, some workers are excluded because of the incompleteness or inadequacy of the data or because they are not representative of the workers generally found in the occupation being studied. Thus, to have at least 50 workers in the final sample, it is sometimes necessary to include 70 or more workers in the sample initially selected for testing.

When a sample of students, trainees, or apprentices is tested for test development purposes, the size of the experimental sample depends upon the objective of the study and the time when testing occurs. If the objective is to develop norms for a vocational course, such as machine shop or radio, or for a college or university area of specialization, it is desirable for the final sample to include at least 50 students. If the testing is done at the beginning of a course, it is desirable to include a much larger number of students since some will drop out before the completion of the course.

When a sample of students, trainees, applicants, or apprentices is tested, the "longitudinal" experimental design is often used. It is generally conceded that ideally it is preferable to establish occupational norms based on samples as similar as possible in respect to age, education, and experience to the group on which it is expected the test norms will be used; that such samples should be tested prior to hiring; and that such hiring should be done without regard to test results. However, in fact, it is not often possible to achieve this ideal in practice. Nevertheless, data have been obtained from a number of studies using the longitudinal experimental design in the development of occupational norms. In this type of design the tests are administered to all applicants for a job rather than to those who are already employed in the job. This experimental design is particularly apropos when a new plant is being staffed and hence no workers are available for study. In this design the entire GATB is administered to all applicants who are referred to an employer, but the test scores are not used in making selections. Only regular interviewing methods are used. After the workers have been on the job a sufficient length of time to reach normal production, criterion data are obtained. Criterion data are also obtained on those individuals who did not complete the training period because of inability to perform job duties satisfactorily. Studies of this type have the advantage of sampling a relatively wide range of ability with respect to both test and job performance. Use of the longitudinal design has the advantage also of precluding the possibility of the test scores being influenced by training on the job. (See Chapter 16 of this Section.)

The longitudinal design is used whenever possible. However, all too often it is not feasible to use this type of experimental design because a waiting period, which may vary from several weeks to several years, is required before test norms can become available for operating purposes. In instances where test norms are required as soon as possible for a particular occupation, the concurrent validation experimental design must be used. The correlations obtained between test results and the criterion in studies of this type are regarded as measures of descriptive or concurrent validity. When studies which yield measures of descriptive or concurrent validity have been conducted, an effort is made to conduct check studies by using the longitudinal design in order to obtain correlations between test results and the criterion that can be regarded as measures of predictive validity. (For further discussion see Chapter 9 of this Section.)

ANALYSIS OF DATA

After the tests have been administered to an experimental sample and the criterion data have been collected, the data are analyzed to determine the group of tests having maximum validity for the occupation. Various methods for analyzing such data have been used. In the early years of the test research program, the Wherry-Doolittle Test Selection Method was used to arrive at the combination of tests for the occupation. When the GATB was introduced, however, the methods of analyzing the data were changed somewhat because the objective became somewhat different—not only to establish test norms for a single occupation but also to relate a given set of occupational norms to the norm structure for groups of occupations, so that a single battery of tests could be scored for a large variety of occupations. This means an interest in occupational differentiation as well as in differentiating good from poor workers within an occupation. The data are now usually analyzed in the following manner:

1. Job analysis or curriculum data are analyzed qualitatively to determine which aptitudes appear to be important to the duties of the job or the course of study and which aptitudes appear to be obviously unrelated or "irrelevant" to the job or course of study.

2. Raw test scores are converted to aptitude scores for each of the aptitudes.

3. The mean is computed for each aptitude. Each mean in the profile of mean aptitude scores obtained for an occupational sample is compared with the other means in the profile to determine for which aptitudes the sample shows its highest performance.

4. Standard deviations are computed for each of the aptitudes to get an indication of the range of talent. These standard deviations are compared with each other and with the corresponding standard deviations for the general working population norms to determine the relative homogeneity of the experimental sample with respect to each of the aptitudes.

5. The coefficient of correlation between each aptitude and the criterion is computed to determine which aptitudes are related to job or course success.

The following criteria are used in determining which aptitudes are to be considered further for inclusion in the final aptitude test battery:

1. A high mean score relative to the other aptitude means obtained for the experimental sample. The aptitudes with the three highest means in the profile obtained for the experimental sample are regarded as having relatively high mean scores; the aptitude with the fourth highest mean is also regarded as having a relatively high mean score if the difference between the third and fourth highest means is less than 1.0.

2. A low standard deviation relative to the general working population and to the other standard deviations obtained for the experimental sample. Aptitudes with standard deviations of less than 15.0 are regarded as having relatively low standard deviations. If more than four aptitudes have standard deviations of less than 15.0, only the four aptitudes with the lowest standard deviations are regarded as having relatively low standard deviations.

3. A correlation with the criterion that is significant at at least the .05 level.

4. A rating of "important" or "critical" on the basis of job analysis or curriculum data (aptitudes which are rated as "irrelevant" on the basis of job analysis or course curriculum data are excluded from further consideration).

Trial norms, consisting of various combinations of aptitudes and cutting scores, are established on the basis of the preceding criteria. An aptitude is considered further for inclusion in trial norms provided that it has *not* been rated by a majority of the analysts as "irrelevant" on the basis of job analysis or course curriculum data and meets the following criteria: (1) any two of the following—a relatively high mean score, a relatively low standard deviation, importance on the basis of job or course analysis data, or (2) a correlation with the criterion that is significant at the .05 or .01 level, or (3) *critical* importance on the basis of job or course analysis data.

As indicated earlier in this chapter in the discussion on criteria, supervisors or foremen are consulted to determine the most appropriate point of dichotomy between high and low criterion groups. For each aptitude selected for inclusion in trial norms, a determination is made of the extent to which the aptitude with appropriate cutting scores discriminates between individuals in the high and low criterion groups. The results serve as a basis for establishing trial norms which consist of various combinations of aptitudes and cutting scores.

When trial test norms are established, minimum scores are set so that the norms tend to (1) qualify most of the individuals in the high criterion group; (2) screen out a majority of the individuals in the low criterion group; and (3) screen out a proportion of the sample which approximates the proportion in the low criterion group, which tends to maximize the stability of the relationship obtained between the norms and the dichotomized criterion.

The relationship between each set of trial norms and the dichotomized criterion is computed by application of the phi coefficient.

ESTABLISHMENT OF FINAL TEST NORMS

The trial norms consist of various combinations of aptitudes and minimum scores; the combination which yields the best selective efficiency is established as the final norms or test battery for the specific occupation being studied.

Norms on Employment Service test batteries are established with the multiple cutoff method. This method has many advantages (Dvorak, 1956). A cutting score is set on each aptitude included in the final battery. There is no total weighted score to be obtained.

In the early days of the test research program total weighted scores were used as occupational norms. These were derived by the Wherry-Doolittle Test Selection Method. About 1945 this method was abandoned because over a long period of time it had been noted that tests measuring abilities which appeared important on the basis of the job analysis were often omitted from the norms. There seemed to be a good explanation for this. The distribution of the test scores for the ability that might be a key ability in the job would have a low standard deviation. This homogeneity of the group on that ability probably resulted from the fact that the workers who did not have a sufficient amount of that ability had not survived on the job. Because of this restriction in range, the correlation between test scores and the criterion would be low.

Furthermore, even when there was no restriction in range, there often seemed to be a relationship between test scores and job proficiency only to an optimum point. Since there was not a straightline relationship throughout the entire range, the Wherry-Doolittle Test Selection Method did not yield that ability in the final norms. For example, finger dexterity might be a crucial ability for some jobs; without a minimum amount of it, persons would not be able to perform successfully on the job; but, beyond a certain point, additional increments of finger dexterity would not be associated with additional production on the job. This was empirically demonstrated in 1967 in a study conducted by the Utah Test Development Field Center. This study was conducted to see if GATB aptitudes could be used to distinguish between average workers who pass the SATB norms and better-than-average workers who pass the SATB norms. This project was initiated because representatives of Joint Apprenticeship Committees believed that the magnitude of GATB scores could be used to help determine rankings of apprenticeship candidates.

Data used for this study came from the S-310 study on Electronics Assembler and nine studies on apprenticeable jobs in the construction industry. Workers from each of these samples who passed the appropriate SATB norms were separated into four ability groups based upon the job proficiency measure used in the study. Aptitude scores of each of these four group were then compared. This study indicated that if an applicant passes the norms for an occupation he will usually have enough ability to learn the job duties of that occupation.

Once this base level is exceeded, however, GATB aptitudes do not distinguish between satisfactory workers and superior workers. SATB's select those who tend to be good workers and those with the highest aptitude potential, but it appears that the amount of job proficiency cannot be judged from the amount by which an examinee's aptitude test scores exceed the minimum aptitude requirements.

Even when a crucial ability does show a straightline relationship between test scores and success, the method of multiple regression weights permits the possession of other abilities to compensate for a low amount of a crucial ability. In our experience, an employer is not satisfied with a worker who is awkward with his fingers in a certain job even though he may have an unusually high amount of the other abilities required by the job. The multiple cutoff method does not permit such compensation of some abilities for others required by the job. As Gaier and Lee (1953) point out, the multiple regression technique throws away much information because it yields a composite index.

DETERMINATION OF VALIDITY OF BATTERY

The validity of the test battery composed of the key aptitudes and cutting scores is determined by means of a correlation coefficient showing the relationship between the norms and the criterion. The phi coefficient is used to indicate this relationship. It is not regarded as significant unless the significance level of the corresponding chi square value is at least .05. (See Chapters 9 & 11 of this Section for information on the validity of specific occupational norms and of Occupational Aptitude Pattern norms.) Validity information for many studies was reported in the Validity Information Exchange when this feature appeared in the journal *Personnel Psychology*. (See entries under "U.S. Employment Service" in the bibliography for references.)

EXAMPLES OF TEST DEVELOPMENT STUDIES

Following are examples of studies conducted to develop test norms for the occupations of Case Worker, Boat Loader (an electronics assembly job) and Claim Adjuster. The test development study on Boat Loader illustrates use of the longitudinal experimental design; the studies on Case Worker and Claim Adjuster illustrate use of the concurrent validation experimental design.

Study of Case Worker 195.108

Job summary. Performs any one or a combination of the following social service duties, in pursuance of a welfare program organized by a public or private agency or organization. Studies physical and social environment of a family, person, or persons in order to determine and execute practical plans for alleviating existing undesirable conditions. Visits home of client for purposes of obtaining initial case history, or supplemental information on a continuing case. Interprets, to recipients and others, requirements and eligibility factors for all categories. Assists clients in gathering verifications. Helps clients to work through their problems and to utilize their own resources and the resources of the community. Handles situations involving planning and major decisions with families regarding relinquishments, child placement, care of dependent children, and children in danger of becoming delinquent. Makes periodic and regular visits as required during the year to the same client. Makes emergency visits when necessary.

Experimental sample. 106 employed workers.

Criterion. Supervisory ratings based on yearly performance ratings.

Statistical results. Table 8–1 shows the statistical results obtained for the experimental sample of 106 Case Workers.

The aptitudes with relatively high mean scores are Verbal Aptitude (V), Clerical Perception (Q), and Intelligence (G).

The aptitudes with relatively low standard deviations are Numerical Aptitude (N), Intelligence (G) and Verbal Aptitude (V).

The data show that Numerical Aptitude (N) correlates significantly with the criterion at the .05 level.

Qualitative analysis. The job analysis indi-

Table 8–1. Means (M), Standard Deviations (S. D.), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB—Case Worker 195.108; N=106

Aptitude	M	S. D.	r
G—Intelligence	116.1	13.2	.152
V—Verbal Aptitude	120.3	13.4	.107
N—Numerical Aptitude	111.6	12.5	.216*
S—Spatial Aptitude	104.6	17.7	—.011
P—Form Perception	102.2	16.5	.146
Q—Clerical Perception	119.0	15.2	.128
K—Motor Coordination	114.7	15.1	.087
F—Finger Dexterity	99.0	20.4	.136
M—Manual Dexterity	98.1	21.2	.189

*Significant at the .05 level.

cated that Intelligence (G), Verbal Aptitude (V), Numerical Aptitude (N), and Clerical Perception (Q) appear to be important in the performance of the duties of Case Worker 195.108. Motor Coordination (K), Finger Dexterity (F), and Manual Dexterity (M) were considered as irrelevant for performing the duties of this occupation.

Summary of qualitative and quantitative data. Table 8–2 summarizes the results of the statistical and qualitative analyses.

Determination of norms. Based on the qualitative and quantitative evidence, Aptitudes G, V, N, and Q were selected for further consideration for inclusion in the test norms. Trial norms consisting of various combinations of three and four of Aptitudes G, V, N, and Q with appropriate cutting scores were evaluated against the criterion by means of the phi coefficient. For this analysis, the criterion was dichotomized by placing 32 of the 106 workers, or 30 percent of the sample, in the low criterion group. The results of the analysis showed that the best selective efficiency was obtained for test norms consisting of G–105, V–105, and N–105.

Effectiveness of norms. Table 8–3 shows the relationship obtained between norms consisting of G–105, V–105, N–105 and the dichotomized criterion. The data in Table 8–3 indicate that 18 of the 32 poor workers, or 56 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 56 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 54 of the 68 workers who made qualifying test scores, or 79 percent, were good workers.

Study of Boat Loader (electronics) 726.884

Job summary. Assembles sub-miniature components, such as silicon discs, molybdenum discs, germanium discs, spherical pellets of indium, spherical pellets of germanium, flat

Table 8–2. Summary of Qualitative and Quantitative Data—Case Worker 195.108

Evidence	Aptitude								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data:									
Important	X	X	X			X			
Irrelevant							X	X	X
Relatively High Mean	X	X				X			
Relatively Low Standard Deviation	X	X	X						
Significant Correlation With Criterion			X						
To Be Considered for Trial Norms	G	V	N			Q			

Table 8–3. Relationship Between Test Norms (G–105, V–105, N–105) and Dichotomized Criterion—Case Worker 195.108: N=106

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	20	54	74
Poor Workers	18	14	32
Total	38	68	106

$\phi = .28$
$P/2 < .005$

metal pieces, wires, base rings and cells to produce such electronic devices as transistors and diodes. Uses vacuum pickups or tweezers to pick up minute parts and position them properly, in correct sequence, in fusion boats.

Experimental sample. 63 applicants who were hired for employment as Boat Loaders.

Criterion. Supervisory ratings based on a descriptive rating scale.

Statistical results. Table 8–4 shows the statistical results obtained for the experimental sample of 63 Boat Loaders.

Table 8–4. Means (M), Standard Deviations (S. D.), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB—Boat Loader 726.884: N=63

Aptitude	M	S. D.	r
G—Intelligence	100.2	10.6	.339**
V—Verbal Aptitude	100.0	12.3	.235
N—Numerical Aptitude	102.9	13.9	.351**
S—Spatial Aptitude	98.6	13.6	.154
P—Form Perception	109.8	12.4	.287*
Q—Clerical Perception	117.5	13.9	.266*
K—Motor Coordination	113.9	14.3	.261*
F—Finger Dexterity	104.3	15.7	.273*
M—Manual Dexterity	102.7	17.2	.181

*Significant at the .05 level.
**Significant at the .01 level.

The aptitudes with relatively high mean scores are Form Perception (P), Clerical Perception (Q), and Motor Coordination (K).

The aptitudes with relatively low standard deviations are Intelligence (G), Verbal Aptitude (V), Spatial Aptitude (S), and Form Perception (P).

The data show that Intelligence (G) and Numerical Aptitude (N) correlate significantly with the criterion at the .01 level; and that Form Perception (P), Clerical Perception (Q), Motor Coordination (K), and Finger Dexterity (F) correlate significantly with the criterion at the .05 level.

Qualitative analysis. The job analysis indicated that Form Perception (P), Motor Coordination (K), and Finger Dexterity (F) appear to be important in the performance of the duties of Boat Loader. Verbal Aptitude (V), and Numerical Aptitude (N) were considered as irrelevant for performing the duties of this occupation.

Summary of qualitative and quantitative data. Table 8–5 summarizes the results of the statistical and qualitative analyses.

Determination of norms. Based on the qualitative and quantitative evidence, Aptitudes G, P, Q, K, and F were selected for further consideration for inclusion in the test norms. Trial norms consisting of various combinations of three and four of aptitudes G, P, Q, K, and F were evaluated against the criterion by means of the phi coefficient. For this analysis, the criterion was dichotomized by placing 22 of the 63 workers, or 35 percent of the sample, in the low criterion group. The results of the analysis showed that the best selective efficiency was obtained for test norms consisting of P–100, Q–100, and K–105.

Effectiveness of norms. Table 8–6 shows the relationship between norms consisting of P–100, Q–100, K–105 and the dichotomized criterion. The data in Table 8–6 indicate that 17 of the 22 poor workers, or 77 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 77 percent of the poor workers would not have been hired

Table 8–5. Summary of Qualitative and Quantitative Data—Boat Loader 726.884.

Evidence	Aptitude								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data:									
Important					X		X	X	
Irrelevant		X	X						
Relatively High Mean					X	X	X		
Relatively Low Standard Deviation	X	X		X	X				
Significant Correlation With Criterion	X		X		X	X	X	X	
To Be Considered for Trial Norms	G				P	Q	K	F	

Table 8–6. Relationship Between Test Norms (P–100, Q–100, K–105) and Dichotomized Criterion—Boat Loader 726.884: N=63

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	11	30	41
Poor Workers	17	5	22
Total	28	35	63

$\phi = .48$
$P/2 < .0005$

if the recommended test norms had been used in the selection process. Moreover, 30 of the 35 workers who made qualifying test scores, or 86 percent, were good workers.

Study of Claim Adjuster 241.168

Job summary. Investigates and adjusts claims for insurance payments in assigned territory of one or more counties. Determines responsibility and liability of insured; estimates damages and authorizes repairs; settles claims for automobile and non-commercial property losses or damages; settles minor and processes major liability claims.

Experimental sample. 106 employed workers.

Criterion. Supervisory ratings based on a descriptive rating scale.

Statistical results. Table 8–7 shows the statistical results obtained for the experimental sample of 106 Claim Adjusters.

The aptitudes with relatively high mean scores are Intelligence (G), Numerical Aptitude (N), and Spatial Aptitude (S).

The aptitudes with relatively low standard deviations are Intelligence (G), Verbal Aptitude (V), Numerical Aptitude (N), and Clerical Perception (Q).

Table 8–7. Means (M), Standard Deviations (S. D.), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB—Claim Adjuster 241.168: N=106

Aptitude	M	S. D.	r
G—Intelligence	115.9	11.5	.203*
V—Verbal Aptitude	108.7	12.2	.199*
N—Numerical Aptitude	115.9	11.4	.315**
S—Spatial Aptitude	113.6	15.2	—.047
P—Form Perception	108.0	15.7	.060
Q—Clerical Perception	111.4	11.5	.264**
K—Motor Coordination	107.3	16.2	.308**
F—Finger Dexterity	96.6	16.7	.139
M—Manual Dexterity	106.6	18.7	.166

*Significant at the .05 level.
**Significant at the .01 level.

The data show that Numerical Aptitude (N), Clerical Perception (Q), and Motor Coordination (K) correlate significantly with the criterion at the .01 level; and that Intelligence (G) and Verbal Aptitude (V) correlate significantly with the criterion at the .05 level.

Qualitative analysis. The job analysis indicated that Intelligence (G), Verbal Aptitude (V), Numerical Aptitude (N) and Clerical Perception (Q) appear to be important in the performance of the duties of Claim Adjuster. Motor Coordination (K), Finger Dexterity (F), and Manual Dexterity (M) were considered as irrelevant for performing the duties of this occupation.

Summary of qualitative and quantitative data. Table 8–8 summarizes the results of the statistical and qualitative analyses.

Determination of norms. Based on the qualitative and quantitative evidence, Aptitudes G, V, N, and Q were selected for further consideration for inclusion in the test norms. Trial norms consisting of various combinations of three and four of Aptitudes G, V, N, and Q with appropriate cutting scores were evaluated against the criterion by means of the phi coefficient. For this analysis, the criterion was dichotomized by placing 34 of the 106 workers, or 32 percent of the sample, in the low criterion group. The results of this analysis showed that the best selective efficiency was obtained for test norms consisting of G–95, V–100, N–95 and K–105.

Effectiveness of norms. Table 33 shows the relationship between norms consisting of G–95, V–100, N–95, Q–105 and the dichotomized criterion. The data in Table 8–9 indicate that 19 of the 34 poor workers, or 56 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 56 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 53 of the 68 workers who made qualifying test scores, or 78 percent, were good workers.

CHECK STUDIES

After the norms have been established on one sample for an occupation, check studies are conducted to determine the effectiveness of the norms when applied to new samples that were not involved in the original standardization. Ideally a test development study for a specific occupation would be based on a group consisting of the entire population of workers in that occupation. Since this is obviously not only a practical impossibility, but would also present technical problems with regard to comparability, it has been necessary to test samples of workers in various specific occupations rather than the total population of any particular occupational group. Practical considerations impose limitations on the size of available samples, and the statistical data for even the

Table 8–8. Summary of Qualitative and Quantitative Data—Claim Adjuster 241.168

Evidence	Aptitude								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data:									
Important	X	X	X	.....	.....	X	.....	.....	.....
Irrelevant	.....	.....	.....	.....	.....	.....	X	X	X
Relatively High Mean	X	.....	X	X	.....	.....	.....	.....	.....
Relatively Low Standard Deviation	X	X	X	.....	.....	X	.....	.....	.....
Significant Correlation With Criterion	X	X	X	.....	.....	X	X	.....	.....
To Be Considered for Trial Norms	G	V	N	.....	.....	Q	.....	.....	.....

Table 8–9. Relationship Between Test Norms (G–95, V–100, N–95, Q–105) and Dichotomized Criterion–Claim Adjuster 241.168: N=106

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	19	53	72
Poor Workers	19	15	34
Total	38	68	106

ø=.29
P/2<.005

largest of available samples are subject to chance errors. Any selected occupational sample can only approach perfect representation of the entire population of workers in that occupation. Other factors, such as the reliability and validity of the criterion, tend to limit the degree of certainty that can be placed on our results. Therefore it would not be wise to accept the results of any one study as the "true" or "final" results, and it is advisable to conduct check studies to verify original findings.

A check study is essentially the repetition of a test development study which resulted in test norms for a particular occupation, on another sample of employed workers, applicants, trainees, apprentices, or students for that same occupation. The sample used in the original study is generally referred to as the validation sample and the one used for the check study is referred to as the cross validation sample. The procedures for collecting and processing the check study data are the same as those employed in the original study.

The selective efficiency of norms that resulted from the original study is evaluated against the dichotomized criterion of the cross validation sample by means of the phi coefficient. Similarly, the norms that show the best selective efficiency for the cross validation sample are evaluated against the criterion of the original sample. The norms that show the better cross validation are selected as the final test norms.

Below are cited the results of some of the original and check studies that have been conducted. Complete data for these studies can be found in Chapter 9 of this Section. For each study, the relationship between the norms and the dichotomized criterion is expressed in terms of the phi coefficient (ø) and the significance level of the corresponding chi square.

Typist, 203.588, Clerk-Typist 209.388 and Stenographer 202.388

An original study and five check studies were conducted. The validation sample consisted of 130 typing and shorthand students who were high school seniors in Minnesota. Cross validation sample I consisted of 60 typing and shorthand students who were high school seniors in North Dakota. Cross validation sample II consisted of 50 shorthand students who were high school juniors and seniors in the State of Washington. Cross validation sample III consisted of 58 typing students who were high school juniors and seniors in the State of Washington. Cross validation sample IV consisted of 51 Clerk-Typists employed in the State of California. Cross validation sample V consisted of 51 tenth grade shorthand students in Iowa. The criteria for the validation and first three cross-validation samples consisted of scores on proficiency tests in typing and/or shorthand, the criterion for cross validation sample IV was supervisory ratings and the criterion for cross validation sample V was grade-point averages. The norms established on the basis of the study consist of G–95, P–100, Q–100 and K–100. The relationships obtained between these norms and the criterion of each sample are as follows:

Sample	ø
Validation sample	.20
Cross validation sample I	.44
Cross validation sample II	.35
Cross validation sample III	.28
Cross validation sample IV	.21
Cross validation sample V	.34

All five of the check studies substantiated the results of the original study in that significant relationships were found between the originally established norms and the criterion.

It is interesting to note that higher correlations were obtained for the cross validation samples than for the validation sample.

Field of Engineering

The validation sample of this study consisted of 60 employed engineers, specializing in various phases of the engineering field. The engineers in the validation sample were employed in companies in Pennsylvania and in Ontario, Canada. Cross validation sample I consisted of 214 college students majoring in engineering in colleges located in North Dakota, Ohio and Utah. Cross validation sample II consisted of 150 students majoring in engineering at the University of Tennessee. The three samples represented various phases of the field of engineering, including chemical, civil, electrical and mechanical engineering. The criteria consisted of rank-order ratings for the employed engineers and of grade point averages for the students. The norms established consist of G-125, N-115 and S-115. The relationships obtained between these norms and the criterion of each sample are as follows:

Sample	ø
Validation sample	.38
Cross validation sample I	.20
Cross validation sample II	.30

Data for other check studies can be found in Chapter 9 of this Section and in the Validity Information Exchange (V.I.E.) of the journal *Personnel Psychology*. References to the V.I.E. are listed under "U.S. Employment Service" in the bibliography at the end of this Section.

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9. Validity of Norms for Specific Occupations

In test development studies, the data collected yield measures of either predictive validity or concurrent validity. (See Chapter 8 of this Section.) Predictive validity is evaluated by showing how well predictions made from the test are confirmed by evidence gathered at some subsequent time. The most common means of checking predictive validity is correlating test scores with a subsequent criterion measure. Concurrent validity is evaluated by showing how well test scores correspond to measures of concurrent criterion performance or status.

These types of validity are quite similar except for the time at which the criterion is obtained in relation to the time of testing. Every effort is made to conduct cross validation or check studies that use the longitudinal experimental design when the original study of an occupation has been conducted on a sample which has yielded concurrent validity data.

The continuing program of GATB research is conducted on a decentralized basis with State employment services gathering data in cooperation with employers, schools, and colleges and feeding it into the national office. The data from the various States are consolidated and occupational norms are issued for national use. The method used for the development of GATB norms for specific occupations is described in Chapter 8 of this Section.

The data for various GATB validation studies are presented in Tables 9–1, 9–2, and 9–3. The data shown in these tables are based on samples used in the development of national aptitude batteries through S–452. (An "S" number is assigned to each specific aptitude test battery at the time it is developed and is used to identify the battery.)

Table 9–1 presents the following information:

1. *Occupation and Code*—The occupational title and code are as given in the *Dictionary of Occupational Titles* (U.S. Department of Labor, 1965).

2. *Sample*—The type of sample is designated as applicant, apprentice, employee, student, or trainee, representing the status of the individuals comprising the sample at the time when the tests were administered—not their status at the time the criterion data were collected (unless both test and criterion data were collected at about the same time). For example, a sample of individuals who are applicants for the job at the time of testing but employees when the criterion data are collected is designated as an "applicant" sample. Each type of sample is defined as follows:

a. *Applicant*—Individuals who are under consideration for the job but have not yet been hired at the time of testing; the employment interviewers are not allowed access to the test scores, so hiring is done without regard to test performance.

b. *Apprentice*—individuals who are under a formal apprenticeship program at the time of testing.

c. *Employee*—individuals who are regularly employed on the job at the time of testing.

d. *Student*—individuals who are enrolled in a vocational school, college, university, or some other type of school at the time of testing.

e. *Trainee*—individuals who are employed but who are completing a formal training course before actually beginning to work on the job and individuals enrolled in a specific vocational training program such as those financed under the Manpower Development and Training Act (MDTA).

Applicant samples always involve the longitudinal design. Each of the other samples may involve either the concurrent validation or longitudinal design. For example, a sample of employed workers might be tested during their first month of employment and the criterion data collected at the end of six months of employment; this would be an application of the longitudinal design. If school grades are used as the criterion for a sample of students and are obtained at the time of testing, this would be an application of the concurrent validation experimental design; if the school grades are obtained about one or more semesters after the tests have been administered, this would be an application of the longitudinal design. It is difficult to obtain large samples of workers performing the same kind of work in one company; hence, many of the samples shown are relatively small. Larger samples can be obtained by pooling the results from several comparable studies. The cross validation or check studies show whether the norms apply equally well in a variety of situations.

3. *Number*—The number of cases in each sample.

4. *Sex*—The number of males and the number of females in each sample.

5. *Age*—The mean and standard deviation expressed in years. A dash (—) indicates that data are not available.

6. *Education*—The mean and standard deviation expressed in years. A dash (—) indicates that data are not available.

7. *Experience*—The mean and standard deviation of the actual work experience of the sample on the particular job at the plant(s) where the study was conducted. Data are expressed in months of experience as of the date when the tests were administered. A dash (—) indicates that data are not available; the word "None" indicates that the sample did not have actual work experience at the time of testing.

8. *Date of Study*—The last year in which the criterion data were collected.

9. *Criterion*—The type of criterion used in the study may be supervisory ratings, instructors' ratings, production records, school grades, or work sample. Discussion of these types of criteria is found in Chapter 8 of this Section.

Training criteria (school grades, instructors' ratings, etc.) and job proficiency criteria (production records, supervisory ratings, etc.) tend to yield different validity in studies on the same occupation. However, the median of the validities (phi coefficients) shown in Table 9–1 are .39 with training criteria and .39 with job proficiency criteria.

10. *GATB Norms*—The aptitudes and minimum scores required are shown.

11. *Phi Coefficient*—The phi coefficient of correlation denoting the relationship between the test norms and the criterion used in the study. The standard used for a significant phi coefficient is one that has a corresponding chi square (with Yates' correction) which is significant at the .05 level.

12. *Type of Validity*—This is listed as either predictive validity or concurrent validity. Predictive validity tends to be slightly higher than concurrent validity in USTES studies. The medians of the phi coefficients shown in Table 9–1 are .42 for predictive validity and .38 for concurrent validity.

As GATB test research continues, validity data on additional occupations will accumulate, providing more evidence regarding the effectiveness of GATB norms for vocational counseling and personnel selection. In addition, check studies will be conducted on applicant samples using the longitudinal design on those occupations for which the GATB norms were established on samples of employed workers. Although studies on applicant groups are desirable, the occupational norms developed from validation studies on samples of employed workers are useful. Ghiselli and Brown (1948, p. 173) state that, ". . . if a test is shown to be valid on a group of workers, it means that it is capable of distinguishing varying amounts of ability through a somewhat restricted range; and inasmuch as the variations in ability will be greater among applicants, the test will have greater discriminatory power when used with them. Effectiveness of prediction is to be interpreted in terms of degree and not as an all-or-none phenomenon."

Table 9–2 presents data on Aptitude G (Intelligence) for specific occupations and lists the occupational title and code as given in the *Dictionary of Occupational Titles* (U.S. Department of Labor, 1965), the number in the sample, and the mean and standard deviation for Aptitude G, where 100 is the mean and 20 is the standard deviation for the general working population sample. In this table the occupations are listed in ascending order of the means obtained on Aptitude G for the various occupational samples. In instances where data were available for more than one sample for the same job, data are shown only for the combined sample. Table 9–2 shows that the rank order of occupations according to their mean scores on Aptitude G is quite similar to the occupational hierarchy presented by Stewart (1947) for the A.G.C.T. Table 9–2 also shows a considerable spread in the average intelligence of workers in various occupations. The spread of the mean scores is about four standard deviation units in terms of the standard score distribution for the GATB general working population.

Table 9–3 presents complete GATB data on aptitudes for specific occupations and lists the occupational title and code as given in the *Dictionary of Occupational Titles* (U.S. Department of Labor, 1965), the number in the sample, the mean and standard deviation for each aptitude (where 100 is the mean and 20 is the standard deviation for the general working population sample), and the Pearson product-moment correlation coefficient between each aptitude and the criterion.

In instances where two or more occupational samples are available, the means, standard deviations, and Pearson product-moment correlation coefficients are first shown for the subsamples, and the means and standard deviations are then shown for the combined sample. (Since the criterion scores for individuals in the subsamples were usually not comparable enough to warrant combining them into one distribution to obtain Pearson product-moment correlation coefficients for the combined sample, such data are not shown.)

The correlation coefficients in Table 9–3 have been presented for each aptitude even when the aptitude has not been included in the GATB norms established for an occupation. These correlations may provide clues to other investigators who are selecting experimental batteries of other tests measuring similar aptitudes for the purpose of developing batteries of tests for the same or related occupations.

Table 9–3 shows that there is variation in the mean scores, standard deviations, and validity coefficients among the aptitudes for a given occupation and that these data tend to differ for the various occupations. This indicates that workers in a given occupation possess differential abilities which are not adequately reflected by a measure of Aptitude G (Intelligence) alone and that differential patterns of aptitudes are important for successful performance in various occupations.

The typical aptitude-criterion validity coefficient obtained is approximately .22 regardless of the type of criterion used (Bemis, 1968). However, the median aptitude-criterion correlations for the cognitive GATB aptitudes (G, V, N, S) are higher with training criteria than they are with job proficiency criteria. The difference is greatest on Aptitude G and least on Aptitude S with Aptitude V and N showing about the same amount of difference. On the other hand, the manipulative aptitudes (K, F, M) tend to correlate higher with job proficiency criteria than with training criteria. The perceptual aptitudes (P and Q) tend to have about the same level of validity with either job proficiency or training criteria.

It is for this reason that a multiple hurdle criterion has been used in some studies where different aptitudes were correlated with success in the book learning and work performance aspects of learning the job. For example, in the research which led to the establishment of the S–284 norms for Pinsetter Mechanic, Automatic, 829.281, both a "classroom rating" and a "field rating" were used. As different aptitude-criterion correlations were obtained with the two criteria, a multiple hurdle criterion was used. This resulted in a battery consisting of Aptitudes N and S (which are highly correlated with the "classroom rating") and Aptitude F (which is highly correlated with the "field rating").

The typical aptitude-criterion concurrent validity coefficient obtained is .18 whereas the typical predictive validity coefficient is .23 (Bemis, 1968). This difference occurs in spite of the fact that the range of ability is about the same in both types of studies. This tendency toward higher predictive validity than concurrent validity occurs with eight of the nine aptitudes.

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Table 9–1. Validity of Norms for Specific Occupations

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
1. Accountant, 160.188 Auditor, 160.188	Validation Sample: Applicants	54	51	3	37.2[1]	9.5	15.9[1]	1.4	None	None	1956	Supervisory ratings	G-105, N-115	.41	Pred.
	Cross Validation Sample: Students	30	28	2	21.3	2.9	16.0	0	None	None	1951	Grade-point averages	G-105, N-115	.64	Pred.
2. Aircraft-And-Engine Mechanic, 621.281	Students	75	75	0	23.2	4.4	12.0	.7	None	None	1965	Grade-point averages	N-90, S-100, F-85	.41	Pred.
3. Aircraft Assembly Occupations, Selected Assembler, Aircraft Structures and Surfaces, 806.381 Assembler, Aircraft Power Plant, 621.381 Aircraft Mechanic, Plumbing and Hydraulics, 862.381 Aircraft Mechanic, Rigging and Controls, 801.381	Employees	52	52	0	38.9	9.4	9.9	2.2	84.2	41.0	1954	Supervisory ratings	S-70, P-70, F-80, M-90	.63	Conc.
4. Airplane Stewardess, 352.878	Trainees	76	0	76	20.6	1.3	12.9	1.0	None	None	1964	Supervisory ratings	G-100, V-90, N-85, Q-100	.42	Pred.
5. Air-Traffic-Control Specialist, Tower, 193.168	Employees	152	151	1	33.7	6.6	12.2	1.4	75.9	41.7	1962	Supervisory ratings	G-110, V-100, N-110, P-85	.30	Conc.
6. Appliance-Cord Assembler, 723.885	Employees	56	0	56	37.7	7.7	11.0	1.6	69.6	73.2	1962	Supervisory ratings	K-90, F-85, M-100	.43	Conc.
7. Artificial-Breeding Technician II, 467.384	Employees	59	59	0	33.1	5.2	11.1	1.8	58.2	26.3	1955	Supervisory ratings	G-90, M-80	.45	Conc.
8. Asparagus Sorter, 529.687	Applicants	136	0	136	35.0	12.2	10.5	2.3	44.1[2]	42.9	1964	Supervisory ratings	K-95, M-95	.26	Conc.
9. Assembler II, 753.887	Employees	50	0	50	33.6	8.5	9.7	1.8	36.2	31.5	1961	Supervisory ratings	Q-75, K-75, M-85	.35	Conc.
10. Assembler (toys and games), 731.884 Model-Airplane Assembler, 731.884 Toy-Train Assembler, 731 834	Employees	140	4	136	33.1	8.8	9.9	1.9	24.4	27.0	1957	Supervisory ratings	K-80, F-90, M-100	.57	Conc.
11. Assembler, Accessories, 729.887	Applicants and Employees	55	0	55	27.3	7.9	10.4	1.8	......	......	1967	Supervisory ratings	Q-100, K-100, F-80	.36	Pred.
12. Assembler, Automobile, 806.887	Employees	72	72	0	29.4	6.5	10.6	2.0	28.5	33.9	1957	Supervisory ratings	P-80, F-80, M-80	.31	Conc.
13. Assembler, Components, 723.884	Employees	55	0	55	29.1	7.7	11.6	1.0	24.0	23.3	1962	Supervisory ratings	P-80, F-85, M-100	.28	Conc.
14. Assembler, Dry Cell and Battery, 727.887	Applicants	94	0	94	29.0	9.1	9.6	1.9	None	None	1954	Supervisory ratings	K-80, F-80, M-80	.53	Pred.
15. Assembler, Hearing Aid and Detector, 726.884	Employees	51	0	51	31.9	10.8	11.0	1.8	6.7	2.1	1962	Supervisory ratings	K-100, F-95, M-110	.52	Conc.

16. Assembler, Medical and Surgical Supplies, 713.885	Validation Sample: Employees	53	0	53	27.8	8.8	11.5	8.3	34.0	22.0	1965	Supervisory ratings	K-85, F-90, M-115	.37	Conc.
	Cross Validation Sample: Employees	60	0	60	35.8	9.9	11.2	1.4	58.2	56.2	1967	Supervisory ratings	K-85, F-90, M-115	.50	Conc.
17. Assembler, Microwave Tube, 692.885	Employees	60	21	49	39.0	10.1	11.5	1.4	68.6	53.4	1966	Supervisory ratings	G-75, K-100, F-90, M-80	.49	Conc.
18. Assembler, Radiosonde, 722.884	Employees	57	0	57	29.8	7.8	10.2	1.5	28.0	30.7	1955	Supervisory ratings	K-85, F-80, M-85	.29	Conc.
19. Audit Clerk, 210.388	Employees	53	6	47	40.1	9.8	12.6	1.3	24.4	22.7	1960	Supervisory ratings	Q-105, K-100, F-80	.50	Conc.
20. Autoclave Operator, 553.782	Employees	52	52	0	34.0	8.1	10.2	1.6	66.6	49.4	1962	Supervisory ratings	G-70, N-75, S-90	.25	Conc.
21. Automobile-Body Repairman, 807.381	Validation Sample: Trainees	56	56	0	28.6	7.5	10.4	1.7	None	None	1964	Instructors' ratings	S-85, P-90, M-90	.55	Pred.
	Cross Validation Sample: Trainees	63	63	0	26.9	9.5	10.3	1.7	None	None	1966	Instructors' ratings	S-85, P-90, M-90	.34	Pred.
22. Automobile Mechanic, 620.281 Foreign Car Mechanic, 620.281	Employees	247	247	0	27.1	7.5	10.9	2.6	29.1	46.9	1966	Supervisory ratings	N-75, S-95, M-90	.25	Conc.
23. Automobile-Service-Station Attendant, 915.867	Employees	52	52	0	31.8	10.8	10.8	1.8	95.7	77.5	1960	Supervisory ratings	N-90, F-80, M-85	.48	Conc.
24. Automobile-Service-Station Mechanic, 620.381	Validation Sample: Trainees	54	54	0	27.9	8.9	10.8	1.4	....	....	1965	Course grades	S-90, P-80, F-80	.45	Pred.
	Cross Validation Sample: Trainees	42	42	0	24.8	7.0	10.6	1.3	None	None	......	Supervisory ratings	S-90, P-80, F-80	.34	Pred.
25. Bag-Machine Operator, 649.885 Waxed-Bag-Machine Operator, 649.885	Employees	55	54	1	30.9	8.4	10.7	1.9	4.5	5.1	1957	Supervisory ratings	S-80, P-70, M-75	.62	Conc.
26. Bagger, 920.887 Bag Sealer, 920.887 Weigher II, 224.487	Employees	50	0	50	39.3	8.4	9.1	2.3	20.3	5.7	1956	Supervisory ratings	F-85, M-80	.32	Conc.
27. Baker, 526.781	Students	65	65	0	17.4	.6	12.0	0	None	None	1955	School grades	S-70, Q-80, F-75	.52	Conc.
28. Bakery-Wagon Driver, 292.358	Employees	52	52	0	32.4	7.1	11.1	1.8	71.1	58.7	1954	Supervisory ratings	G-95, N-100, Q-85	.29	Conc.
29. Balling Machine Operator II, 689.885	Employees	66	0	66	24.2	6.5	9.7	1.6	17.3	26.2	1963	Supervisory ratings	P-80, K-85, M-80	.42	Conc.
30. Barber, 330.371	Validation Sample: Students	95	95	0	24.5	6.9	10.8	1.8	None	None	1962	Supervisory ratings	P-80, K-85, F-90	.31	Pred.
	Cross Validation Sample I: Students[3]	51	49	2	34.8	10.0	11.4	1.5	42.7	46.2	1965	Instructors' ratings	P-80, K-85, F-90	.33	Pred.
	Cross Validation Sample II: Students	61	58	3	27.4	9.9	10.8	1.6	None	None	1962	Instructors' ratings and course grades	P-80, K-85, F-90	.43[4] .36[5]	Pred. Pred.
31. Baser, 692.885 Threader, 725.887	Employees	62	0	62	23.7	4.0	10.4	1.5	18.2	17.2	1950	Production records	K-75, F-85, M-80	.35	Conc.
32. Battery Loader, 683.886	Employees	48	3	45	37.3	7.6	8.1	2.3	109.0	78.8	1960	Supervisory ratings	K-80, F-70, M-75	.41	Conc.

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[1] N=53.
[2] N=107.
[3] Experienced barbers enrolled in refresher courses.
[4] Based on instructors' ratings.
[5] Based on course grades.

Table 9–1. *Validity of Norms for Specific Occupations*—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
33. Bench Carpenter, 760.884	Trainees	48	48	0	33.7	12.3	10.5	1.7	None	None	1966	Instructors' ratings	S–75, Q–90, F–75	.44	Pred.
34. Billet Yard Jobs Pickler, 503.885 Scarfer, 816.884 Chipper I, 705.884	Applicants	80	80	0	21.6	2.0	11.7	.9	None	None	1965	Supervisory ratings	P–105, M–95	.45	Pred.
35. Bindery Worker, 643.885	Employees	103	28	75	36.1	9.7	11.0	1.6	84.5	64.8	1966	Supervisory ratings	S–70, Q–80, K–95, F–75	.37	Conc.
36. Biologist, 041.081	Students	50	50	0	21.3	1.2	16.0	0	None	None	1961	School grades	N–110, S–105, Q–110	.52	Conc.
37. Blown Plastic Container Machine Operator, 556.885	Employees	58	58	0	29.0	7.1	11.0	1.5	26.0	18.9	1966	Supervisory ratings	G–85, P–85, Q–95	.23	Conc.
38. Boarding-Machine Operator, 589.885	Employees	103	1	102	30.3	6.4	10.1	1.8	5.5	3.7	1953	Production records	K–75, F–70, M–85	.29	Conc.
39. Boat Loader, 726.884	Applicants	63	0	63	23.1	7.6	11.6	1.1	None	None	1959	Supervisory ratings	P–100, Q–100, K–105	.48	Pred.
40. Body Maker Feeder and Side Seam Tender, 616.884	Employees	49	49	0	34.1	8.4	11.3	1.8	67.4	69.9	1969	Supervisory ratings	N–75, F–70, M–80	.24	Conc.
41. Boilermaker I, 805.281	Employees	81	81	0	42.1	7.9	11.4	1.5	140.8	66.3	1963	Supervisory ratings	N–70, S–80, Q–70, M–70	.33	Conc.
42. Bomb-Fuse-Parts Assembler, 737.884	Applicants	90	0	90	21.6	4.2	11.2	1.5	None	None	1951	Supervisory ratings	P–95, K–85, F–80, M–80	.47	Pred.
43. Book-and-Game Line Attendant, 920.887	Applicants	59	0	59	23.7	6.6	11.4	1.1	None	None	1961	Supervisory ratings	N–85, K–85, M–85	.46	Pred.
44. Bookkeeper I, 210.388	Students	66	56	10	32.8	11.1	11.9	1.3	None	None	1958	Instructors' ratings	G–90, V–95, N–95	.49	Conc.
45. Bookkeeping-Machine Operator I, 215.388	Employees	102	0	102	22.6	4.2	12.1	.7	27.1	19.4	1948	Production records and supervisory ratings	N–100, P–105, Q–110, F–95	.21	Conc.
46. Braiding-Machine Operator, 689.885	Employees	51	9	42	39.7	11.1	8.5	2.0	93.9	112.6	1960	Supervisory ratings	K–70, F–75, M–80	.42	Conc.
47. Bricklayer, 861.381	Students	50	50	0	18.4	1.3	11.0	1.2	None	None	1952	School grades	N–85, S–90, P–90, K–85	.52	Pred.
48. Cabinetmaker, 660.280	Validation Sample: Students	81	81	0	20.5	5.1	10.9	1.1	None	None	1956	Instructors' ratings	N–85, S–105, M–85	.36	Conc.
	Cross Validation Sample: Employees	31	31	0	41.5	15.8	10.6	18.6	29.6	23.2	1964	Supervisory ratings	N–85, S–105, M–85	.34	Conc.
49. Cable Assembler, 709.884	Employees	53	0	53	34.4	9.6	10.3	1.5	27.2	33.4	1967	Supervisory ratings	G–75, Q–95, F–85	.50	Conc.
50. Cable Maker, 726.884	Validation Sample: Employees	70	70	0	26.1	5.6	11.0	1.8	20.2	10.4	1958	Supervisory ratings	G–90, P–85, Q–90, F–80	.44	Conc.
	Cross Validation Sample: Employees	30	30	0	26.7	8.6	11.7	1.1	4.9	3.9	1962	Supervisory ratings	G–90, P–85, Q–90, F–80	.63	Conc.

51. Calculating-Machine Operator, 216.488	Employees	53	0	53	32.0	10.9	11.9	.9	90.6	83.2	1955	Supervisory ratings	N-95, P-100, Q-105, K-95	.40	Conc.
52. Candy Packer, 920.887	Employees	75	0	75	39.0	6.4	9.8	1.8	108.6	44.2	1960	Supervisory ratings	K-80, F-80, M-85	.38	Conc.
53. Candy Wrapping-Machine Operator, 920.885	Employees	63	0	63	35.3	6.9	9.9	1.7	136.0	62.5	1956	Supervisory ratings	P-75 F-90, M-80	.26	Conc.
54. Cannery Worker (Machine Operators) Corn-Cutting Machine Operator, 529.886 Corn-Husking-Machine Operator, 529.886 Cutter, Machine, 529.886	Employees	194	0	194	35.0	11.6	9.4	2.2	....	....	1957	Supervisory ratings	K-75, F-75, M-75	.44	Conc.
55. Cannery Worker (Trimmers and Sorters) Sorter, 529.886 Trimmer, 529.886 Cutter, Hand, 529.887	Validation Sample: Employees	377	0	377	38.8	11.4	9.1	2.2	....	....	1957	Supervisory ratings and production records	K-85, F-75, M-80	.35	Conc.
	Cross Validation Sample: Employees	33	0	33	46.8	11.7	10.3	1.9	101.5	32.2	1964	Supervisory ratings	K-85, F-75, M-80	.37	Conc.
56. Capacitor Winder, 726.884	Employees	53	1	52	41.3	12.8	10.0	1.6	103.5	98.5	1967	Supervisory ratings	N-80, Q-95, K-75	.34	Conc.
57. Carder, 712.887 Assembler, 712.887	Employees	58	0	58	39.4	10.9	10.5	1.8	122.6	118.5	1966	Supervisory ratings	Q-105, K-95, M-85	.63	Conc.
58. Carding-Machine Operator, 681.885	Employees	51	0	51	28.1	10.2	10.3	1.5	36.1	55.4	1954	Supervisory ratings	K-90, M-85	.46	Conc.
59. Card Tender, 680.885	Employees	53	53	0	32.5	13.7	8.6	2.2	69.4	85.1	1964	Supervisory ratings	K-70, M-70	.32	Conc.
60. Carpenter, 860.381	Apprentices	119	119	0	22.2	4.2	10.9	1.9	None	None	1952	School grades and supervisory ratings	N-80, S-85, K-70, M-80	.54	Pred.
61. Carpet Layer, 299.381 Floor Layer, 864.781	Employees	101	101	0	37.7	8.8	10.9	1.7	149.9	91.9	1960	Supervisory ratings	N-85, S-95, M-80	.43	Conc.
62. Carton-Forming-Machine Operator, 641.885	Employees	53	53	0	38.8	9.4	10.5	1.8	146.5	85.2	1964	Supervisory ratings	S-80, P-70, M-70	.60	Conc.
63. Case Coverer, 739.884 Case Liner, 739.884	Applicants	50	0	50	32.9	9.6	10.7	1.7	None	None	1960	Supervisory ratings	S-80, K-90, F-90, M-95	.67	Pred.
64. Case Worker, 195.108	Employees	106	35	71	35.8	8.5	16.7	.9	61.4	54.5	1959	Supervisory ratings	G-105, V-105, N-105	.28	Conc.
65. Cementer, Hand, 788.887	Applicants	54	0	54	36.2	8.3	10.5	1.6	None	None	1958	Supervisory ratings	K-80, F-85, M-85	.42	Pred.
66. Cementer, Life Rafts, 751.887	Applicants	56	0	56	32.7	7.6	10.5	1.8	None	None	1955	Supervisory ratings	P-75, F-80, M-70	.60	Pred.
67. Cement Mason, 844.884	Employees	52	52	0	36.2	8.1	10.3	1.7	129.8	68.8	1961	Supervisory ratings	N-70, S-70, M-85	.36	Conc.
68. Central-Office Operator, 235.862	Employees	88	0	88	23.7	5.6	11.7	.9	43.6	46.1	1951	Supervisory ratings	G-85, P-95, K-90, M-90	.38	Conc.
69. Central-Office Repairman, 822.281	Employees	64	64	0	30.2	7.4	12.1	1.2	34.4	41.9	1954	Supervisory ratings	S-105, Q-85, M-85	.46	Conc.
70. Cereal Packer, 920.887	Employees	54	0	54	32.8	4.7	10.1	1.7	23.6	15.3	1957	Supervisory ratings	K-95, M-100	.30	Conc.

Table 9–1. *Validity of Norms for Specific Occupations*—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
71. Charwoman, 381.887 Maid, Hospital, 323.887 Porter I, 381.887	Employees	83	52	31	40.8	10.3	11.3	1.9	107.7	66.4	1962	Supervisory ratings	V–70, M–70	.40	Conc.
72. Cheese Wrapper and Packer, 920.887	Employees	61	0	61	25.6	8.0	9.7	2.2	14.9	11.4	1950	Supervisory ratings	K–90, F–85, M–90	.42	Conc.
73. Chemical and Metallurgical Technology-Technical Institute Training, 008.—and 011.—	Students	55	55	0	20.7	3.2	13.6	.5	None	None	1966	Grade-point averages	V–95, N–105, S–95	.51	Pred.
74. Chemical Operator III, 559.782	Employees	50	50	0	38.9	7.8	10.7	1.6	53.0	57.4	1964	Supervisory ratings	N–80, S–100, P–70	.38	Conc.
75. Circular Knitter, 685.885	Employees	53	52	1	34.5	12.3	10.4	1.3	49.2	55.9	1964	Supervisory ratings	G–75, S–75, F–90	.59	Conc.
76. Claim Adjuster, 241.168	Employees	106	106	0	32.4	5.8	13.8	1.8	36.9	33.0	1962	Supervisory ratings	G–95, V–100, N–95, Q–105	.29	Conc.
77. Classifier, 361.687	Employees	52	1	51	40.2	11.6	10.1	1.8	69.0	83.8	1963	Supervisory ratings	Q–70, M–85	.24	Conc.
78. Clerical Occupations, Selected, Checker II, 209.688 IBM Coder, 219.388 Inserter, 230.887 Letter-Opener Operator, 231.588 Mail Clerk, 231.588 Sorter, 209.688	Employees	66	6	60	32.9	9.5	12.1	1.2	......	......	1951	Supervisory ratings	Q–100, K–100	.39	Conc.
79. Clerk, General Office, 219.388	Validation Sample: Employees	198	10	188	27.6	9.6	12.4	1.1	40.5	52.3	1957	Supervisory ratings	G–95, V–90, N–90, Q–110	.19	Conc.
	Cross Validation Sample: Employees	103	9	94	29.7	10.5	12.0	.8	61.4	74.5	1961	Supervisory ratings	G–95, V–90, N–90, Q–110	.30	Conc.
80. Clothes Designer, 142.081	Students	149	13	136	20.3	2.2	......	......	......	......	1955	School grades	G–100, S–100, P–100, K–95	.29	Conc.
81. Coding Clerk, 219.388	Employees	64	0	64	37.9	11.7	12.1	1.0	21.4	22.5	1967	Supervisory ratings	V–95, Q–95, K–90	.29	Conc.
82. Coil Assembler, 706.884 Air-Conditioning-Unit Installer, 827.884	Applicants	61	61	0	28.8	6.7	11.1	1.6	None	None	1956	Supervisory ratings	G–85, M–75	.38	Pred.
83. Coil Finisher, 724.887	Employees	53	0	53	36.7	9.8	10.0	2.0	61.9	30.8	1959	Supervisory ratings	S–80, Q–90, F–80	.45	Conc.
84. Coil Winder II, 724.884	Employees	65	65	0	37.2	10.2	10.3	2.1	54.8	28.3	1961	Supervisory ratings	P–80, Q–90, F–85, M–85	.52	Conc.
85. Coin-Vending-Machine Collector, 292.483	Employees	57	57	0	30.7	9.4	11.4	1.3	38.2	40.2	1966	Supervisory ratings	K–100, M–85	.26	Conc.
86. Composition Roofer, 866.381	Apprentices	50	50	0	25.7	4.1	10.6	1.6	29.0	6.6	1961	Supervisory ratings and instructors' ratings	P–70, K–70, M–80	.61	Conc.

87. Compositor I, 973.381	Employees	107	107	0	38.7	7.8	10.7	2.1	214.1	113.1	1953	Supervisory ratings	N-85, Q-95, M-90	.37	Conc.
88. Compression-Molding-Machine Tender, 556.885	Validation Sample: Employees	56	56	0	32.6	9.8	10.6	1.9	47.0	44.2	1961	Supervisory ratings	K-75, F-85, M-85	.62	Conc.
	Cross Validation Sample: Employees	35	23	12	29.9	6.0	10.0	1.8	22.2	18.4	1958	Supervisory ratings	K-75, F-85, M-85	.33	Conc.
89. Computer Technology Trainee, 828.XX	Validation Sample: Students	179	178	1	21.9[6]	4.9	12.4[7]	1.0	None	None	1967	Course grades	G-110, N-95, S-100	.42	Pred.
	Cross Validation Sample: Students	173	173	0	23.9[8]	5.4	12.5[8]	.9	None	None	1968	Course grades	G-110, N-95, S-100	.40	Pred.
90. Construction-Equipment Mechanic, 620.281	Employees	50	50	0	33.0	7.9	10.2	2.0	78.4	46.7	1961	Supervisory ratings	N-75, S-85, F-75	.31	Conc.
91. Container-Maker-Filler-Packer Operator, 920.885	Employees	53	0	53	45.4	8.2	9.2	1.7	83.5	53.3	1960	Supervisory ratings	K-90, F-75, M-75	.47	Conc.
92. Conveyor-Loader, Plastic Toy Parts, 920.887	Employees	48	17	31	32.8	9.8	10.4	1.8	10.5	9.4	1964	Supervisory ratings	K-80, M-100	.34	Conc.
93. Cook, 313.381	Students	160	155	5	22.0	4.5	11.9	1.2	None	None	1962	Grade-point averages	S-85, P-90, F-70, M-70	.24	Conc.
94. Cook, Short Order, 314.381	Trainees	46	18	28	30.1	11.8	10.0	1.3	None	None	1968	Instructors' ratings	S-70, P-80, Q-80	.49	Pred.
95. Copy Holder, 209.588 Proofreader I, 209.688	Employees	105	4	101	34.4	11.6	11.8	1.2	78.8	85.5	1957	Work sample scores and supervisory ratings	G-85, V-100, P-95, Q-100	.35	Conc.
96. Core-Plane Wirer, 726.884	Employees	58	0	58	29.6[9]	9.2	10.9[9]	1.8	12.4[9]	7.0	1964	Supervisory ratings	G-75, P-75, K-90, F-100	.26	Conc.
97. Correction Officer, 372.868	Employees	51	51	0	40.5	8.1	11.6	1.5	67.3	54.8	1965	Supervisory ratings	V-95, N-95, P-85, Q-100	.39	Conc.
98. Corrugator Operator, 643.782	Employees	70	70	0	38.1	9.1	10.0	1.8	89.2	84.3	1967	Supervisory ratings	Q-75, K-70, M-85	.22	Conc.
99. Cosmetologist, 332.271	Students	99	1	98	22.6	6.9	11.4	1.0	None	None	1954	Instructors' ratings and school grades	S-90, P-80, Q-95, M-75	.32	Conc.
100. Cottage Parent, 355.878	Applicants	56	5	51	37.6	11.1	10.2	2.0	None	None	1966	Supervisory ratings	K-95, M-85	.29	Pred.
101. Counselor II, 045.108	Employees	53	49	4	33.1	8.1	16.2	.6	44.0	58.6	1966	Supervisory ratings	G-105, N-105, Q-105	.34	Conc.
102. Counselor, Camp, 159.228	Validation Sample: Employees	65	24	41	19.2	1.3	13.1	.9	13.9	11.0	1962	Supervisory ratings	G-100, V-95, Q-105	.31	Conc.
	Cross Validation Sample: Employees	90	34	56	20.9	19.8	14.5	13.7	4.5	3.3	1965	Supervisory ratings	G-100, V-95, Q-105	.31	Conc.
103. Countergirl, 311.878 Counterman, Lunchroom or Coffee Shop, 311.878	Employees	50	6	44	30.0	10.1	9.8	1.6	48.0	49.1	1959	Supervisory ratings	P-85, K-75, F-75, M-75	.52	Conc.
104. Counterman, Automotive Parts, 289.358	Employees	53	53	0	38.8	9.9	11.9	1.7	95.4	59.6	1959	Supervisory ratings	G-90, N-90, Q-95	.35	Conc.
105. Credit Man, 168.268	Employees	59	59	0	33.6	9.0	15.1	1.4	90.5	88.3	1964	Supervisory ratings	V-90, Q-110, K-100	.29	Conc.
106. Custodian, School, 381.887	Employees	87	87	0	44.5	11.0	10.0	1.8	40.0	37.6	1963	Supervisory ratings	V-70, M-85	.23	Conc.

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[6] N=272.
[7] N=271.
[8] N=241.
[9] N=50.

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
107. Cutting-and-Creasing Pressman, 649.782	Employees	77	77	0	39.2	9.3	10.1	1.7	146.5	85.8	1964	Supervisory ratings	N-70, S-90, P-70	.32	Conc.
108. Decorator, Hand, 740.884	Employees	70	0	70	27.1	8.6	......	......	27.5	22.8	1950	Supervisory ratings	S-90, P-95, K-95	.25	Conc.
109. Dental Assistant, 079.378	Validation Sample: Students	53	0	53	21.3	7.3	12.1	.7	None	None	1960	Instructors' ratings	G-90, S-90, Q-95, F-90	.53	Pred.
	Cross Validation Sample I: Students	85	0	85	21.6	5.3	12.4	.9	None	None	1963	Instructors' ratings	G-90, S-90, Q-95, F-90	.22	Pred.
	Cross Validation Sample II: Students	121	0	121	18.3	1.9	12.1	.4	None	None	1965	Instructors' ratings	G-90, S-90, Q-95, F-90	.39	Pred.
	Cross Validation Sample III: Employees	31	0	31	28.0	8.5	12.5	1.5	16.6	18.2	1965	Supervisory ratings	G-90, S-90, Q-95, F-90	.44	Conc.
	Cross Validation Sample IV: Students	52	0	52	18.5	.7	12.1	.4	None	None	1966	Grade-point averages and instructors' ratings	G-90, S-90, Q-95, F-90	.24	Pred.
110. Dental Hygienist, 078.368	Students	83	0	83	19.3[10]	1.6[10]	12.8	.9	None	None	1952	School grades	G-110, S-95, P-110	.48	Pred.
111. Dental-Laboratory Technician, 712.381	Validation Sample: Employees	56	45	11	36.5	10.0	10.4	1.8	154.3	111.8	1963	Supervisory ratings	S-80, P-80, K-80, M-85	.38	Conc.
	Cross Validation Sample I: Employees	54	50	4	32.0	7.4	10.5	1.9	139.7	87.1	1964	Supervisory ratings	S-80, P-80, K-80, M-85	.29	Conc.
	Cross Validation Sample II: Employees	54	49	5	35.8	12.8	11.2	1.7	152.5	131.2	1966	Supervisory ratings	S-80, P-80, K-80, M-85	.47	Conc.
112. Dentist, 072.108	Validation Sample: Students	96	93	3	22.9	3.3	14.9	1.0	None	None	1950	Lecture and laboratory grades	G-115, S-110, P-100, F-85	.39	Pred.
	Cross Validation Sample: Students	81	79	2	22.6	2.7	14.5	.8	None	None	1953	Lecture and laboratory grades	G-115, S-110, P-100, F-85	.26	Pred.
113. Department-Head Buyer, 299.138	Employees	59	12	47	44.5	9.4	12.4	1.4	82.3	84.9	1967	Supervisory ratings	N-80, P-85, Q-90	.24	Conc.
114. Die-Casting-Machine Operator II, 514.885	Employees	50	50	0	35.1	8.7	9.8	2.2	101.5	57.4	1959	Supervisory ratings	S-80, P-75, F-75	.59	Conc.
115. Die Cutter, 699.782	Employees	86	86	0	29.0	6.9	9.7	2.1	49.1	64.4	1957	Supervisory ratings	S-75, M-80	.37	Conc.
116. Die Maker, 739.381	Employees	58	58	0	37.3	9.9	10.9	1.7	133.4	94.7	1964	Supervisory ratings	N-80, S-90, M-90	.44	Conc.

117. Diesel Mechanic, 625.281	Students	52	52	0	21.8	4.2	14.2	.5	None	None	1967	Grade-point averages	N-95, S-105, K-90, M-100	.44	Conc.
118. Dietary Aid, 317.877	Trainees	49	0	49	19.3	1.1	10.3	2.1	None	None	1967	Supervisory ratings	G-70, P-75, M-70	.56	Pred.
119. Dietitian, 077.168	Trainees	57	0	57	23.7	3.0	......	......	......	......	1950	Supervisory ratings	G-105, V-105, N-110	.46	Conc.
120. Digital-Computer Operator, 213.382	Validation Sample: Employees	77	68	9	29.4	7.8	12.6	1.2	38.8	51.3	1963	Supervisory ratings	G-110, V-95, N-100	.59	Conc.
	Cross Validation Sample: Employees	67	62	5	26.6	5.2	12.8	1.1	29.3	24.7	1964	Supervisory ratings	G-110, V-95, N-100	.56	Conc.
121. Director, Funeral, 187.168 Embalmer, 338.381	Students	50	47	3	24.4	3.9	14.2	.5	42.2	30.2	1956	Grade-point averages	G-100, V-95, N-105	.57	Conc.
122. Director, School Lunch Program, 187.168	Employees	87	0	87	49.2	8.2	11.1	1.7	64.7	38.2	1961	Supervisory ratings	G-80, V-80, Q-80	.45	Conc.
123. Dispatcher, Motor Vehicle, 919.168	Employees	50	50	0	35.8	9.8	13.9	2.2	59.7	48.0	1962	Supervisory ratings	G-115, V-100, N-100	.65	Conc.
124. Distribution Clerk, 231.688	Applicants	80	12	68	33.1	9.4	12.7	1.7	None	None	1958	Work sample	G-90, Q-85, K-85	.46	Pred.
125. Doffer, 689.886	Validation Sample: Employees	57	57	0	36.6	12.3	8.3	2.1	176.3	138.0	1964	Supervisory ratings	P-70, F-60, M-65	.23	Conc.
	Cross Validation Sample: Employees	32	32	0	27.8	10.1	8.5	1.7	81.4	89.0	1959	Piece-rate earnings	P-70, F-60, M-65	.34	Conc.
126. Draftsman, Architectural, 001.281 Draftsman, Civil, 005.281 Draftsman, Geological, 010.281 Draftsman, Mechanical, 007.281 Draftsman, Structural, 005.281 Detailer, 017.281	Validation Sample: Employees	232	215	17	37.7	9.6	13.8	1.7	133.6	86.4	1969	Supervisory ratings	N-90, S-115, P-90, Q-100	.38	Conc.
	Cross Validation Sample I: Employees	60	54	6	33.6	7.9	13.7	1.1	88.0	65.4	1969	Supervisory ratings	N-90, S-115, P-90, Q-100	.33	Conc.
	Cross Validation Sample II: Students	130	129	1	24.4	6.5	11.6	1.0	None	None	1970	Instructors' ratings	N-90, S-115, P-90, Q-100	.24	Conc.
	Cross Validation Sample III: Students	115	114	1	21.4	3.4	14.0	.4	None	None	1967	Grade-point averages	N-90, S-115, P-90, Q-100	.21	Conc.
127. Egg Candler, 529.687	Employees	52	0	52	32.5	7.7	10.4	1.5	14.0	9.8	1957	Supervisory ratings	P-80, K-85, M-100	.29	Conc.
128. Electric-Motor Assembler, 721.884	Employees	60	0	60	34.0	9.9	9.3	2.0	14.4	5.6	1951	Supervisory ratings	K-90, F-80, M-80	.40	Conc.
129. Electric Toothbrush Assembler, 723.884	Applicants	61	0	61	29.4	8.9	10.8	1.5	None	None	1965	Supervisory ratings	Q-100, F-75, M-90	.28	Pred.
130. Electrical Technology-Technical Institute Training, 003.	Students	63	63	0	20.4	1.6	......	......	......	......	1964	Grade-point averages	G-115, V-100, N-95, S-110	.42	Conc.
131. Electrician, 824.281	Validation Sample: Apprentices	124	124	0	23.5	4.6	11.9	.8	28.8	13.2	1954	Supervisory ratings	N-85, S-100, F-85, M-85	.33	Conc.
	Cross Validation Sample: Employees [Journeymen]	129	129	0	35.2	7.8	11.4	1.7	117.6[11]	82.8	1954	Supervisory ratings	N-85, S-100, F-85, M-85	.26	Conc.

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[10] N=80
[11] N=128

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
132. Electrician, Airplane, 825.281 Aircraft Mechanic, Armament, 801.381	Employees	51	51	0	32.7	7.0	11.1	1.7	74.6	30.0	1954	Supervisory ratings	N–85, S–80, K–75	.54	Conc.
133. Electronic-Resistance-Spot-Welder, 726.884	Employees	50	1	49	28.8	8.1	11.3	1.1	13.5	16.6	1964	Supervisory ratings	G–70, S–85, K–90	.36	Conc.
134. Electro-Mechanical Assembly Curriculum, 70XX; 72XX	Students	50	50	0	34.3	10.8	10.6	2.0	None	None	1968	Instructor's ratings	N–70, S–70, F–70, M–80	.51	Pred.
135. Electronics Assembler, 726.781	Validation Sample: Applicants	147	0	147	31.3	7.8	11.7	.9	None	None	1964	Supervisory ratings	G–85, S–80, P–85, M–95	.45	Pred.
	Cross Validation Sample: Employees	57	0	57	28.3	10.0	11.3	1.6	......	......	1966	Supervisory ratings	G–85, S–80, P–85, M–95	.25	Conc.
136. Electronics Foreman, 726.134	Employees	72	72	0	24.8	4.0	12.6	1.0	9.1	8.7	1965	Supervisory ratings	G–105, V–90, M–100	.55	Conc.
137. Electronics Mechanic, 726.281	Employees	50	50	0	30.2	6.6	12.4	1.5	15.2	11.1	1956	Supervisory ratings	S–95, P–90, M–95	.54	Conc.
138. Electronics Technician, 003.181	Students	97	97	0	22.6	3.8	13.8	.6	......	......	1964	Grade-point averages	N–105, S–100, P–90	.39	Conc.
139. Employment Clerk, 205.368	Employees	57	13	44	41.2	13.4	12.4	2.2	77.9	80.5	1956	Supervisory ratings	G–85, V–100, N–90, Q–95	.60	Conc.
140. Encoder, 209.588	Employees	50	12	38	27.2	7.3	12.4	1.1	22.4	11.2	1964	Production records	Q–95, K–105, M–85	.37	Conc.
141. Engineer, 197.130	Students	64	64	0	21.6	1.7	14.4	.7	None	None	1969	Grade-point averages and performance ratings	G–95, Q–100, F–85	.35	Conc.
142. Engineer, Selected Classifications Chemical Engineer, 008.081 Civil Engineer, 005.081 Electrical Engineer, 003.081 Mechanical Engineer, 007.081	Validation Sample: Employees	60	60	0	33.4	7.8	16.1	.4	74.4	74.1	1950	Supervisory ratings	G–125, N–115, S–115	.33	Conc.
	Cross Validation Sample I: Students	214	......	......	......	......	......	......	None	None	1950	School grades	G–125, N–115, S–115	.18	Conc.
	Cross Validation Sample II: Students	150	......	......	......	......	......	......	None	None	1952	School grades	G–125, N–115, S–115	.29	Conc.
143. Engineering Aid II, 019.281	Students	57	57	0	21.7	5.0	11.7	1.1	None	None	1963	Grade-point averages	N–90, S–115, P–95	.35	Pred.
144. Envelope-Machine Set-Up Man, 641.780	Employees	51	51	0	38.9	10.0	10.6	1.6	12.4	13.2	1965	Supervisory ratings	S–75, P–85, K–80	.40	Conc.
145. Experimental Assembler, 739.381	Employees	61	61	0	34.7	11.5	11.0	1.7	26.9	28.6	1964	Supervisory ratings	V–85, P–75, K–75, F–80	.55	Conc.
146. Exterminator, 389.884	Employees	55	55	0	36.3	9.1	11.0	1.9	22.9	44.0	1960	Supervisory ratings	S–85, K–75, M–90	.27	Conc.

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147. Extruder Operator, 557.782	Employees	57	57	0	29.8	6.6	10.9	1.4	28.9	19.3	1961	Supervisory ratings	Q-90, K-85, M-100	.42	Conc.
148. Extruding-Machine Operator, 691.782	Employees	84	84	0	30.6	7.2	11.4	1.1	33.1	21.0	1964	Supervisory ratings	G-90, N-75, Q-75	.24	Conc.
149. Fancy Stitcher, 690.782 Top Stitcher, 690.782 Vamp Stitcher, 690.782	Employees	113	0	113	44.0	10.6	9.1	1.8	136.9	116.1	1958	Supervisory ratings	P-80, K-80, M-85	.63	Conc.
150. Farm Hand, Dairy I, 411.884	Trainees	54	54	0	28.9	9.5	9.6	1.9	None	None	1967	Grade-point averages for classroom and on-the-job training	S-75, K-70, M-75	.41	Pred.
151. Fettler, 779.884	Employees	35	0	35	38.3	9.4	8.5	1.9	34.7	30.3	1951	Supervisory ratings	F-75, M-75	.45	Conc.
152. File Clerk II, 206.388	Applicants	50	0	50	28.6	9.8	12.1	1.7	None	None	1950	Supervisory ratings	G-95, Q-95	.68	Pred.
153. Finisher, Hand, 754.884	Employees	50	0	50	30.2	11.0	11.1	2.1	11.2	15.3	1962	Supervisory ratings	P-90, F-80, M-95	.67	Conc.
154. Finisher, Hand, 731.887 Toy Assembler, Plastic, 731.887 Toy Assembler, Metal, 731.884	Employees	75	0	75	33.2	11.1	10.8	1.8	13.0	18.2	1963	Supervisory ratings	Q-85, K-85, M-85	.19	Conc.
155. Fire Fighter, 373.884	Employees	60	60	0	33.5	5.6	11.8	.8	74.6	51.6	1957	Supervisory ratings	G-90, S-90, P-95, M-90	.62	Conc.
156. Firesetter, 692.380	Employees	52	52	0	37.3	7.2	10.7	1.7	63.2	31.8	1957	Supervisory ratings	G-80, K-80, M-90	.54	Conc.
157. Fireworks Assembler, 737.887	Applicants	75	0	75	35.9	7.8	11.6	.9	None	None	1953	Supervisory ratings	F-95, M-95	.79	Pred.
158. Fish and Game Warden, 379.168	Employees	80	80	0	35.2	10.1	12.2	1.3	88.1	77.2	1962	Supervisory ratings	V-90, S-85, Q-85, K-70	.41	Conc.
159. Fish Cleaner, 525.884	Employees	51	1	50	43.6	7.8	10.4	1.7	115.0	68.2	1963	Supervisory ratings	K-90, F-85, M-70	.25	Conc.
160. Fishing-Rod Assembler, 732.884	Employees	56	18	38	33.9	8.5	10.2	1.9	5.1	2.2	1955	Supervisory ratings	F-80, M-85	.65	Conc.
161. Flatwork Jobs, 363.886 Assembler, 369.687	Validation Sample: Employees	75	34	41	35.5	11.8	10.8	1.7	61.0	60.4	1962	Supervisory ratings	K-80, M-80	.37	Conc.
Flatwork Catcher, 363.886 Flatwork Feeder, 363.886 Flatwork Finisher, 363.886 Flatwork Folder, 363.886 Trucker, Hand, 929.887	Cross Validation Sample: Employees	74	0	74	38.4	9.6	9.0	1.7	53.7	61.4	1954	Supervisory ratings	K-80, M-80	.31	Conc.
162. Flexographic Press Man I, 651.782	Employees	75	75	0	35.4	8.3	10.8	1.8	106.2	70.0	1965	Supervisory ratings	S-90, P-70, M-90	.28	Conc.
163. Folding-Machine Operator, 653.782	Employees	50	50	0	35.7	8.9	10.0	1.6	123.9	99.5	1958	Supervisory ratings	G-85, N-90, Q-85	.48	Conc.
164. Food-Service Supervisor, 319.138	Students	50	39	11	22.2	4.5	14.4	.5	None	None	1968	Grade-point averages	G-95, Q-100, M-110	.24	Conc.
165. Food Service Worker II, 317.884	Employees	100	49	51	36.1	11.9	11.3	1.7	46.5	11.2	1962	Supervisory ratings	Q-70, F-70, M-85	.17	Conc.
166. Forester, 040.081	Employees	80	80	0	40.6	9.4	15.9	1.2	128.0	105.7	1961	Supervisory ratings	V-110, S-105, K-90	.26	Conc.
167. Forester Aid, 441.384	Trainees	78	78	0	23.3	5.7	12.2	.5	None	None	1966	Instructors' ratings	V-90, N-95, K-90, M-90	.42	Pred.
168. Fork-Lift-Truck Operator, 922.883	Employees	66	66	0	35.7	5.6	9.8	1.8	35.3	8.7	1957	Supervisory ratings	G-75, K-90, M-80	.33	Conc.
169. Fountain Girl, 319.878	Employees	100	2	98	34.1	12.6	11.3	1.5	49.0	44.9	1964	Supervisory ratings	P-75, F-85, M-85	.27	Conc.
170. Fourdrinier-Machine Tender, 539.782 Back Tender, Paper Machine, 534.782	Employees	84	84	0	39.8	8.5	11.0	1.9	76.8	61.2	1968	Supervisory ratings	N-80, S-75, Q-95	.47	Conc.

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
171. Fruit Sorter, 529.687 Cherry Sorter, 529.687 Olive Sorter, 529.687 Packer, 920.887 Apple Packer, 920.887 Cherry Packer, 920.887 Citrus-Fruit Packer, 920.887 Plum Packer, 920.887	Employees	327	1	326	39.6	11.7	9.4	2.0	......	......	1957	Supervisory ratings	P–70, F–70, M–70	.37	Conc.
172. Garment Folder, 789.887	Applicants	55	0	55	27.6	6.8	10.0	1.7	None	None	1954	Supervisory ratings	P–75, K–80, F–80, M–80	.67	Pred.
173. Garment Looper, 689.782	Employees	52	0	52	26.7	5.4	8.5	2.4	4.3	3.1	1960	Supervisory ratings	K–95, F–105, M–95	.40	Conc.
174. Garment Packer, 920.887	Employees	51	51	0	30.9	10.4	11.1	1.6	48.2	49.5	1965	Supervisory ratings	G–80, V–85, N–85, Q–80	.47	Conc.
175. Gasoline Engine Assembler, 806.781	Validation Sample: Employees	59	14	45	27.0	5.5	......	......	22.4	25.2	1952	Supervisory ratings	P–80, K–75, F–75, M–85	.53	Conc.
Internal-Combustion Engine Assembler, 806.781 Outboard-Motor Assembler, 806.781	Cross Validation Sample: Applicants	45	0	45	34.4	7.3	10.3	2.0	None	None	1953	Supervisory ratings	P–80, K–75, F–75, M–85	.45	Pred.
176. Gas-Pump-Computer Assembler, 710.884	Employees	52	10	42	26.2	5.1	11.5	.9	11.3	2.3	1957	Supervisory ratings	S–90, F–95, M–90	.29	Conc.
177. Gas Serviceman, 637.281	Employees	51	51	0	39.6	9.2	10.9	1.7	15.8	8.8	1961	Supervisory ratings	G–90, N–80, P–70	.48	Conc.
178. General Labor Worker, 899.887	Applicants	61	61	0	23.9	6.0	11.1	1.2	None	None	1965	Supervisory ratings	P–95, F–75, M–85	.61	Pred.
179. General Practitioner, 070.108	Students	49	....	....	......	......	16.0	0	None	None	1948	Grade-point averages	G–125, V–115, N–110, S–110	.58	Conc.
180. Glass Blower, Laboratory Apparatus, 772.281	Students	50	49	1	20.5	2.0	13.2	.7	None	None	1965	Course grades	S–95, P–95, M–95	.38	Pred.
181. Glazier, 865.781	Employees	55	55	0	35.7	6.9	10.5	1.6	123.7	63.2	1959	Supervisory ratings	N–80, S–105, P–75	.32	Conc.
182. Goggle-Glass Cutter, 713.884 Lens Cutter II, 713.884	Employees	50	0	50	36.0	5.6	9.9	1.8	139.1	62.4	1958	Supervisory ratings	K–90, F–85	.38	Conc.
183. Grid Operator, 725.884	Employees	63	0	63	33.6	8.9	10.6	1.7	30.9	13.4	1957	Supervisory ratings and production records	P–90, F–85, M–100	.33	Conc.
184. Grocery Checker, 299.468	Trainees	237	123	114	28.0	2.4	12.0	1.7	None	None	1958	Instructors' ratings and scores on work sample of "checking".	G–100, N–95, Q–100	.34	Conc.

185. Gyroscope Assembler, 710.884	Employees	50	16	34	35.4	10.3	10.9	1.9	35.9	31.7	1962	Supervisory ratings	S-80, F-95, M-85	.46	Conc.
186. Hand Sewer, Shoes, 788.884	Validation Sample: Trainees	64	64	0	30.5	13.3	9.0	2.0	None	None	1964	Instructors' ratings	S-80, F-75, M-90	.52	Pred.
	Cross Validation Sample I: Trainees	39	14	25	24.4	7.2	10.4	1.7	None	None	1965	Supervisory ratings	S-80, F-75, M-90	.32	Pred.
	Cross Validation Sample II: Trainees	53	12	41	24.5	8.9	11.3	1.4	None	None	1966	Supervisory ratings	S-80, F-75, M-90	.37	Pred.
187. Heat Treater I, 504.782 Heat Treater II, 504.782	Employees	78	78	0	37.6	10.9	10.5	2.3	122.2	93.0	1967	Supervisory ratings	P-80, Q-90, M-70	.37	Conc.
188. Hosiery Looper, 680.782	Employees	87	0	87	30.1	9.4	10.6	1.6	76.0	71.7	1957	Supervisory ratings	S-75, F-85, M-75	.44	Conc.
189. Hospital-Admitting Clerk, 237.368	Students	59	0	59	43.1	9.3	12.2	1.4	None	None	1966	Instructors' ratings	G-95, V-90, Q-90	.50	Pred.
190. Illustrator, 141.081	Students	52	39	13	21.5	2.3	14.4	.7	None	None	1968	Grade-point averages	G-95, S-110, P-120, K-95	.40	Conc.
191. Industrial Chemistry Technology-Technical Institute Training, 008.	Students	55	46	9	20.5	2.3	......	......	......	......	1964	Grade-point averages	G-115, V-105, P-105	.47	Conc.
192. Industrial Technology-Technical Institute Training, 012.	Students	52	52	0	20.7	1.5	......	......	......	......	1963	Grade-point averages	G-105, V-95, N-115	.30	Conc.
193. Ingot Mold Foundry Jobs Hand Rammer, 518.381 Sand-Slinger Operator, 518.883 Knockoutman, 519.887	Validation Sample: Applicants	71	71	0	25.5	6.4	11.3	1.3	None	None	1965	Supervisory ratings	P-90, K-85, M-100	.24	Pred.
	Cross Validation Sample: Applicants	73	73	0	23.9	4.9	11.4	1.2	None	None	1965	Supervisory ratings	P-90, K-85, M-100	.21	Pred.
194. Inhalation Therapist, 079.368	Employees	81	66	15	30.0	9.6	12.6	1.0	34.9	34.8	1964	Supervisory ratings	V-100, S-85, Q-90	.40	Conc.
195. Injection-Molding-Machine Tender, 556.885	Employees	74	36	38	32.0	10.0	10.0	1.9	37.6	37.7	1961	Supervisory ratings	P-85, Q-85, K-95	.66	Conc.
196. Inspector, 712.887 Inspector, Plastic, 712.687	Employees	55	7	48	42.1	10.5	10.2	1.7	155.1	117.6	1966	Supervisory ratings	S-75, P-85, K-90	.52	Conc.
197. Inspector, Assemblies and Installations, 806.381	Trainees	81	81	0	26.7	8.2	11.5	2.7	None	None	1967	Course grades	G-100, Q-95, K-80	.47	Pred.
198. Inspector, Mechanical and Electrical, 710.384	Employees	50	45	5	32.9	9.1	11.9	1.3	55.8	55.5	1965	Supervisory ratings	N-95, S-90, M-80	.62	Conc.
199. Inspector-Packer, 774.387	Employees	50	1	49	43.4	7.5	10.0	1.6	77.7	56.1	1962	Supervisory ratings	P-75, K-85, M-75	.37	Conc.
200. Inspector, Subassemblies, 726.384	Employees	51	....	....	36.4	8.6	10.4	1.8	57.9	18.4	1961	Supervisory ratings	Q-85, F-85, M-105	.25	Conc.
201. Inspector and Machine Operator, Diode Subassemblies, 726.685	Employees	52	0	52	24.8	4.8	11.2	1.4	9.4	11.0	1966	Supervisory ratings	P-90, K-105, M-95	.27	Conc.
202. Inspectors, Selected Crusher Inspector, 619.685 Mill-End Inspector, 619.687 Mill Inspector, 619.387 Pipe and Coupling Sizer, 619.687 Pipe Walker, 619.687 Thread Inspector, 619.687	Applicants	70	70	0	29.2	8.6	12.1	2.4	None	None	1956	Supervisory ratings	G-75, N-75, S-85, M-80	.74	Pred.

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
203. Instrument Repairman I, 710.281	Validation Sample: Trainees	65	65	0	26.4	4.3	12.7	1.1	......	......	1964	Course grades	N–85, S–100, P–80	.35	Pred.
	Cross Validation Sample: Trainees	58	58	0	31.6	9.3	11.9	.9	......	......	1965	Instructors' ratings	N–85, S–100, P–80	.26	Pred.
204. Insulating-Machine Operator, 601.782 Pairing-Machine Operator, 691.885	Employees	54	51	3	27.0	5.4	11.5	1.1	None	None	1964	Supervisory ratings	P–80, K–85, M–80	.54	Pred.
205. Insulation-Blanket Maker, 809.884	Employees	55	5	50	37.0	8.9	10.1	1.8	26.7	20.1	1956	Supervisory ratings	P–75, F–75, M–85	.33	Conc.
206. Insulation Worker, 863.884	Employees	50	50	0	39.1	10.8	11.2	1.8	196.6	96.8	1968	Supervisory ratings	N–75, M–85	.33	Conc.
207. Intercom Serviceman II, 829.281	Employees	53	53	0	33.3	9.1	11.7	1.9	62.1	36.9	1957	Supervisory ratings	V–80, S–100, F–75	.41	Conc.
208. Iron and Steel Jobs Laborer, General, 509.886 Coil-Opener-and-Down-Ender Operator, 613.782 Conveyor Man II, 921.883 Cooling-Conveyor Operator, 921.883 Tester-Conveyor Operator, 921.883 Thread-Entry-Conveyor Operator, 921.883 Yard-Transfer-Conveyor Operator, 921.883	Applicants	64	64	0	36.8	7.7	10.7	2.5	None	None	1962	Supervisory ratings	G–80, S–75, M–75	.68	Pred.
209. Job Analyst, 166.088	Employees	59	48	11	34.4	9.1	15.5	1.2	11.7	3.9	1961	Supervisory ratings	G–110, V–115, S–95	.27	Conc.
210. Key-Punch Operator, 213.582	Employees	193	0	193	27.5	9.5	12.1	.7	40.4	45.5	1960	Supervisory ratings	G–85, N–85, Q–90, F–95	.34	Conc.
211. Knitting-Machine Fixer, Socks, 689.280	Employees	51	51	0	39.8	7.4	9.2	2.0	185.1	70.2	1955	Supervisory ratings	N–75, S–80, F–75	.39	Conc.
212. Laboratory Tester I, 029.281	Employees	118	39	79	24.9	4.8	13.7	1.7	25.5	24.6	1950	Supervisory ratings	G–110, V–110, N–105, S–100	.20	Conc.
213. Laborer, Bakery, 929.886	Employees	57	0	57	33.9	10.8	10.5	1.7	61.9	84.2	1963	Supervisory ratings	G–80, P–80, K–100	.74	Conc.
214. Ladies'-Hat Trimmer, 784.884	Employees	34	0	34	45.3	10.0	8.6	1.4	40.2	105.4	1950	Production records	S–85, K–70, F–70	.47	Conc.
215. Lather, 842.781	Employees	64	64	0	34.9	9.8	11.2	1.6	162.8	114.7	1966	Supervisory ratings	N–80, S–85, M–75	.37	Conc.
216. Lemon Picker, 404.887	Employees	50	38	12	38.6	13.4	8.6	2.5	29.5	45.0	1965	Supervisory ratings	P–75, K–70, M–70	.40	Conc.
217. Levers-Lace Machine Operator, 683.782	Employees	54	54	0	28.3	6.7	10.7	2.1	40.9	31.8	1967	Supervisory ratings	P–85, K–80, M–90	.29	Conc.

218. Librarian, 100.168	Validation Sample: Employees	281	65	216	40.9	10.9	17.3	.8	88.2	97.4	1963	Supervisory ratings	G–110, N–100, Q–110, K–100	.21	Conc.
	Cross Validation Sample: Students	85	17	68	35.0	9.8	16.8	.6	None	None	1968	Grade-point averages	G–110, N–100, Q–110, K–100	.48	Pred.
219. Light-Bulb Assembler, 692.885	Employees	50	0	50	29.9	5.9	10.7	1.6	40.3	26.3	1953	Supervisory ratings	K–90, F–95, M–90	.31	Conc.
220. Lineman, Repair, 821.381	Employees	59	59	0	36.8	8.3	10.7	1.9	31.3	65.0	.1958	Supervisory ratings	S–90, K–70	.31	Conc.
221. Linen-Supply Load Builder, 920.687	Employees	50	2	48	38.7	10.9	10.0	1.8	60.0	55.0	1963	Supervisory ratings	Q–90, M–90	.34	Conc.
222. Linotype Operator, 650.582	Students	164	164	0	24.3	4.9	11.6	1.2	6.4	2.5	1956	Instructors' ratings	V–80, P–85, K–85	.39	Conc.
223. Loader, 920.887	Employees	55	0	55	36.5	10.4	11.2	1.4	47.9	52.2	1964	Supervisory ratings	G–80, P–80, F–80	.41	Conc.
224. Log Scaler, 941.488	Employees	75	75	0	38.9	10.2	11.7	2.0	99.8	30.2	1966	Supervisory ratings	N–90, P–80, K–75	.53	Conc.
225. Loom Fixer, 683.280	Employees	50	50	0	39.2	8.7	8.6	2.1	127.8	87.4	1958	Supervisory ratings	N–70, P–75, M–75	.69	Conc.
226. Luggage-Hardware Assembler, 706.884	Employees	51	0	51	34.9	6.7	9.3	2.0	89.1	59.1	1957	Supervisory ratings	K–80, F–85, M–80	.57	Conc.
227. Machine Attendant, 619.885	Employees	50	13	37	35.5	11.3	9.5	2.1	39.7	28.0	1961	Supervisory ratings	K–90, F–85, M–95	.49	Conc.
228. Machine Operator, Mass Mailing, 234.885	Employees	51	0	51	30.0	10.9	11.2	1.3	None	None	1964	Production records	P–90, K–95, M–90	.67	Pred.
229. Machine Operators, Selected Cold-Mill Operator, 613.782 Hot-Mill Operator, 613.782 Payoff Operator, 503.885 Rewind Operator, 509.782 Slitting-Machine Operator II, 615.782	Employees	51	51	0	26.9	4.9	11.1	1.3	21.1	11.7	1956	Supervisory ratings	S–80, P–80, F–85, M–85	.52	Conc.
230. Machine Operators, Selected Cold-Saw Operator, 607.782 Cold-Sizing-Mill Operator, 613.782 Decambering-Mill Operator, 613.782 Flying-Cut-Off-Machine Operator, 619.782 Rotary-Straightener Operator, 613.782 Straightener-Machine Operator, 613.782 Tube-Straightener Operator, 613.782 Welder, Pipe Making, 616.380 Welder, Assistant, Pipe Making, 616.380	Applicants	54	54	0	37.4	8.8	10.8	2.3	None	None	1962	Supervisory ratings	S–75, P–70, F–75	.84	Pred.
231. Machinery Erector, 638.281	Employees	55	55	0	39.2	11.7	11.2	1.5	125.1	98.4	1967	Supervisory ratings	N–75, S–90, M–75	.32	Conc.
232. Machining Operator, Ceramics, 679.885	Employees	51	6	45	36.4	7.7	9.8	1.8	56.3	42.0	1963	Supervisory ratings	G–75, F–70, M–70	.26	Conc.

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	ϕ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
233. Machinist I, 600.280	Validation Sample: Employees	71	71	0	35.0	8.9	11.0	1.7	115.0	85.2	1952	Supervisory ratings	N–80, S–80, M–80	.36	Conc.
	Cross Validation Sample I: Students	40	40	0	21.5	7.0	11.1	1.9	None	None	1952	Instructors' ratings	N–80, S–80, M–80	.58	Pred.
	Cross Validation Sample II: Trainees	66	66	0	23.8	4.4	11.8	1.1	None	None	1967	Supervisory ratings and Blue Print Reading Scores	N–80, S–80, M–80	.42	Pred.
234. Maintenance Man, Building, 899.381	Applicants	86	86	0	41.9	9.6	9.8	1.6	None	None	1965	Instructor's ratings	G–70, V–70, N–75	.32	Conc.
235. Maintenance Man, Factory or Mill, 899.281	Applicants	53	53	0	28.0	7.4	11.6	1.0	None	None	1966	Supervisory ratings	G–105, N–90, M–90	.83	Pred.
236. Maintenance Mechanic II, 638.281	Employees	84	84	0	40.5	8.7	10.8	2.2	120.9	84.4	1968	Supervisory ratings	V–85, P–80, Q–80	.33	Conc.
237. Manager, City Circulation, 163.118	Employees	38	38	0	27.5	6.4	12.3	1.3	36.1	50.5	1951	Supervisory ratings	G–100, N–110, Q–100	.48	Conc.
238. Manager, Industrial Organization, 189.118	Students	70	66	4	21.6	3.1	......	......	None	None	1957	Grade-point averages	G–95, V–100, S–100	.46	Conc.
239. Manager, Restaurant or Coffee Shop, 187.168	Employees	76	75	1	33.3	10.0	11.5	1.8	24.6	18.2	1968	Supervisory ratings	V–85, Q–95, K–90	.25	Conc.
240. Manager, Retail Food, 185.168	Validation Sample: Employees	61	61	0	34.5	7.1	11.9	1.5	51.9	58.6	1961	Supervisory ratings	G–105, P–95, Q–100	.51	Conc.
	Cross Validation Sample: Employees	82	82	0	37.1	8.4	11.7	1.8	81.2	61.1	1961	Supervisory ratings	G–105, P–95, Q–100	.27	Conc.
241. Manager, Store I, 185.168	Students	51	33	18	19.5	.8	13.1	.4	None	None	1966	Grade-point averages	V–95, S–90, P–85, Q–100	.25	Pred.
242. Manager, Theatre, 187.168	Employees	32	32	0	31.4	7.5	12.4	1.1	103.3	87.5	1951	Supervisory ratings	G–95, V–95, N–105	.63	Conc.
243. Manufacturers' Service Representative, 638.281	Validation Sample: Employees	55	55	0	44.6	8.4	10.0	2.2	156.2	61.4	1959	Supervisory ratings	N–70, S–85, M–75	.35	Conc.
Millwright, 638.281	Cross Validation Sample: Employees	40	40	0	42.8	8.4	10.7	1.7	135.8	87.9	1968	Supervisory ratings	N–70, S–85, M–75	.31	Conc.
244. Marker II, 920.887	Employees	60	0	60	30.8	7.6	11.2	1.1	18.8	1.6	1960	Supervisory ratings	S–85, P–80, M–85	.33	Conc.
245. Mathematician, 020.088	Students	52	43	9	22.1	2.5	......	......	......	......	1963	Grade-point averages	G–130, N–120, S–120	.41	Conc.
246. Meat Cutter, 316.884	Validation Sample: Employees	50	50	0	32.9	7.6	11.6	1.2	150.7	83.1	1966	Supervisory ratings	S–85, P–80, M–85	.68	Conc.

	Cross Validation Sample I: Employees	49	49	0	33.2	7.6	11.2	1.6	76.7	57.2	1965	Supervisory ratings	S-85, P-80, M-85	.33	Conc.
	Cross Validation Sample II: Employees	70	70	0	30.9	8.1	11.7	1.5	115.1	85.2	1966	Supervisory ratings	S-85, P-80, M-85	.24	Conc.
247. Meat Packaging Occupations, Selected Casing Tier, 529.887 Packer, Sausage and Weiner, 920.887 Sealer, Sliced Bacon, 920.887 Tamale Packer, 920.887	Employees	50	0	50	28.6	6.7	6.8	1.6	14.7	17.7	1951	Supervisory ratings	K-90, F-80, M-80	.23	Conc.
248. Mechanical Technology-Technical Institute Training, 007.	Students	55	55	0	20.1	1.1	......	......	......	......	1963	Grade-point averages	G-115, S-115, P-100	.39	Conc.
249. Medical Assistant, 079.368	Employees	49	0	49	43.8	8.7	12.9	1.3	63.6	62.3	1962	Supervisory ratings	G-85, V-105, N-80, Q-95	.50	Conc.
250. Medical-Laboratory Assistant, 078.381	Students	81	1	80	19.6	2.7	12.5	.7	......	......	1966	Percentage grade on certification examination	N-100, S-110, Q-110	.48	Conc.
251. Medical Technologist, 078.281	Students	113	13	100	24.2	4.4	15.7	1.2	None	None	1958	Supervisory ratings	G-110, V-110, P-105, Q-110	.34	Conc.
252. Mender, 782.884 Burler, 689.684	Employees	52	0	52	27.3	5.5	10.8	1.1	15.2	9.2	1955	Supervisory ratings	P-85, K-90, F-75, M-85	.51	Conc.
253. Merchandise Packer, 920.887	Employees	77	0	77	35.3	8.1	10.2	1.6	8.2	4.3	1959	Supervisory ratings	N-70, Q-85, F-70, M-85	.58	Conc.
254. Metal-Chair Assembler, 739.884	Employees	52	0	52	24.5	4.9	9.1	1.9	11.1	8.5	1960	Production ratings	K-80, F-80, M-90	.59	Conc.
255. Metal Fabricator I, 619.380	Employees	51	51	0	22.6	4.9	10.5	1.5	......	......	1960	Supervisory ratings	S-90, P-70, F-70, M-85	.55	Pred.
256. Metallurgical Technology-Technical Institute Training, 011.	Students	59	59	0	20.7	1.5	......	......	......	......	1963	Grade-point averages	G-115, N-110, S-100	.32	Conc.
257. Micro-Logic Assembler, 726.884	Employees	50	0	50	35.4	7.2	10.8	1.4	10.1	6.8	1965	Supervisory ratings	Q-110, F-75	.45	Conc.
258. Model Maker I, 693.381	Trainees	62	55	7	29.0[12]	10.9	12.3[13]	1.4	None	None	1968	Instructors' ratings	S-90, P-75, M-90	.57	Pred.
259. Module Assembler II, 726.884	Validation Sample: Employees	52	0	52	35.3	8.2	11.0	1.7	48.3	22.0	1961	Supervisory ratings	Q-85, F-90, M-110	.38	Conc.
	Cross Validation Sample: Employees	50	0	50	36.8	7.5	10.2	1.7	122.1	96.4	1959	Supervisory ratings	Q-85, F-90, M-110	.34	Conc.
260. Molded-Goods-Inspector-Trimmer, 759.687	Employees	50	0	50	37.7	9.3	11.1	1.6	None	None	1969	Supervisory ratings	Q-90, K-85, M-85	.37	Pred.
261. Molder, Bench, 518.381 Molder, Floor, 518.381	Applicants	54	54	0	24.2	4.6	11.5	1.2	None	None	1965	Supervisory ratings	N-90, P-100, M-85	.50	Pred.
262. Monotype-Keyboard Operator, 650.582	Employees	52	49	3	36.1	10.4	11.9	.9	152.4	116.7	1958	Supervisory ratings	V-85, Q-105, K-95	.48	Conc.
263. Mounter I, 726.887	Validation Sample: Employees	208	0	208	24.4	4.4	11.2	1.3	33.5	26.2	1951	Production records and supervisory ratings	P-85, K-85, F-85, M-80	.21	Conc.

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[12] N=60.
[13] N=56.

Table 9–1. *Validity of Norms for Specific Occupations*—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
	Cross Validation Sample: Applicants	73	0	73	23.7	4.6	10.7	1.6	9.6	2.2	1949	Production records	P-85, K-85, F-85, M-80	.26	Pred.
264. Mounter, Color Film, 976.885	Employees	50	0	50	31.6	11.5	10.0	1.9	16.1	8.3	1959	Supervisory ratings	G-75, P-70, F-75, M-80	.49	Conc.
265. Multiple-Photographic-Printer Operator, 976.782	Employees	50	11	39	31.8	9.1	10.8	2.1	83.2	62.6	1955	Supervisory ratings	P-85, K-90, M-100	.33	Conc.
266. Multi-Moulding Unit Operator, 712.884 Heater Operator, 712.884	Employees	66	14	52	34.7	11.3	10.8	1.6	84.9	118.2	1966	Supervisory ratings	P-70, Q-95, M-75	.35	Conc.
267. Mushroom Inspector, 529.886	Employees	74	0	74	36.9	10.9	9.0	2.0	45.0	41.7	1961	Supervisory ratings	K-75, F-70, M-70	.23	Conc.
268. Napkin Packager, 920.885	Employees	69	0	69	29.0	13.7	11.0	1.6	49.8	62.5	1965	Supervisory ratings	Q-85, F-90, M-90	.62	Conc.
269. Nurse Aid, 355.878	Validation Sample: Employees	199	14	185	39.6	11.2	11.6	1.6	65.7	59.3	1963	Supervisory ratings	G-80, V-80, K-85	.32	Conc.
	Cross Validation Sample: Employees	155	0	155	31.8	11.8	10.9	1.7	18.8	20.3	1954	Supervisory ratings	G-80, V-80, K-85	.30	Conc.
270. Nurse, General Duty, 075.378	Validation Sample: Students	80	0	80	19.3	5.9	12.3	.5	None	None	1966	Graduation from training program	G-100, N-95, Q-100, K-95	.41	Pred.
	Cross Validation Sample I: Students	94	0	94	21.6	2.8	12.4	.9	None	None	1966	Grade-point averages	G-100, N-95, Q-100, K-95	.24	Conc.
	Cross Validation Sample II: Students	100	0	100	19.8	1.5	12.0	.0	None	None	1967	Grade-point averages	G-100, N-95, Q-100, K-95	.19	Pred.
271. Nurse, Licensed, Practical, 079.378	Validation Sample: Trainees	94	0	94	39.1	8.4	11.2	1.4	None	None	1969	Supervisory ratings	G-85, N-80, Q-85, M-80	.30	Conc.
	Cross Validation Sample: Students	111	0	111	20.2	.6	12.1	.5	None	None	1961	Grade-point averages	G-85, N-80, Q-85, M-80	.26	Conc.
272. Nut Sorter, 521.887	Employees	74	0	74	34.5	9.4	8.1	2.1	30.5	34.3	1955	Supervisory ratings	F-75, M-80	.42	Conc.
273. Occupational Therapist, 072.128	Validation Sample: Students	83	4	79	22.1	3.0	14.8	1.0	None	None	1966	Grade-point average and internship ratings	V-110, F-95, M-95	.33	Pred.
	Cross Validation Sample: Employees	75	2	73	32.3	8.9	16.5	.8	67.0	55.1	1964	Supervisory ratings	V-110, F-95, M-95	.22	Conc.

274. Occupational Therapy Aid, 079.368	Trainees	65	4	61	38.3	13.2	12.3	1.3	9.8	5.2	1967	Grade-point averages and internship ratings	V-95, P-75, Q-95, M-80	.61	Pred.
275. Office-Machine Serviceman, 633.281 Adding-Machine Serviceman, 633.281 Calculating-Machine Serviceman, 633.281 Cash Register Serviceman, 633.281 Duplicating-Machine Serviceman, 633.281 Typewriter Serviceman, 633.281	Validation Sample: Trainees	62	62	0	26.2	5.3	11.3	1.6	None	None	1952	Instructors' ratings	S-90, P-85, K-80, M-85	.50	Conc.
	Cross Validation Sample: Employees	55	55	0	39.3	11.3	11.1	1.7	154.1	104.6	1961	Supervisory ratings	S-90, P-85, K-80, M-85	.40	Conc.
276. Offset-Duplicating-Machine Operator, 207.782	Employees	86	61	25	30.9	9.5	11.8	1.4	65.6	68.1	1965	Supervisory ratings	P-75, F-80, M-90	.32	Conc.
277. Offset-Web-Press Man, 651.782	Employees	53	53	0	38.6	7.0	11.3	1.4	126.4	87.0	1965	Supervisory ratings	Q-80, K-85, M-70	.32	Conc.
278. Oil-Burner-Installation-And-Serviceman, 862.281	Employees	77	77	0	38.2	8.2	10.9	1.5	125.5	77.5	1962	Supervisory ratings	G-95, S-85, F-85	.26	Conc.
279. Onion Corer, 529.886	Employees	61	0	61	27.0	7.2	9.1	1.9	30.5	21.5	1962	Supervisory ratings	K-85, F-80, M-80	.22	Conc.
280. Operating Engineer II, 859.883	Employees	92	92	0	39.8	10.8	10.9	2.3	13.3	8.5	1964	Supervisory ratings	N-75, S-80, K-75	.25	Conc.
281. Order Filler, 922.887	Validation Sample: Employees	51	0	51	27.7	9.2	10.9	1.3	8.8	12.8	1960	Supervisory ratings	Q-95, K-80, F-85	.41	Conc.
	Cross Validation Sample: Employees	55	41	14	29.7	11.9	11.0	1.6	58.3	59.2	1961	Supervisory ratings	Q-95, K-80, F-85	.48	Conc.
282. Ornamental-Iron Worker, 809.381 Structural-Steel Worker, 801.781	Apprentices	77	77	0	24.7	2.8	11.5	3.1	30.6	19.4	1961	Supervisory ratings	S-85, P-80, Q-90, M-85	.34	Conc.
283. Osteopathic Physician, 071.108	Students	93	89	4	23.4	2.1	16.1	.5	None	None	1967	Grade-point averages	G-105, V-110, N-110	.36	Pred.
284. Packager, Machine, 920.885	Employees	85	85	0	31.5	8.2	11.2	1.4	74.3	67.3	1968	Supervisory ratings	S-85, F-70, M-95	.43	Conc.
285. Packager, Solutions and Syringes, 920.885	Employees	32	0	32	35.2	13.6	10.3	2.0	13.3[14]	11.1	1945	Supervisory ratings	K-95, F-80, M-80	.44	Conc.
286. Packaging-Machine Mechanic, 920.280	Employees	103	103	0	37.0	9.8	10.4	1.8	69.7	52.4	1958	Supervisory ratings	S-70, K-80, F-90, M-100	.56	Conc.
287. Packer, 920.887	Employees	58	13	45	34.8	8.1	10.7	1.6	30.8	39.1	1960	Supervisory ratings	Q-75, K-80, M-100	.30	Conc.
288. Painter, 840.781	Apprentices and Students	202	202	0	22.4	2.2	11.0	1.3	....	....	1960	Instructors' ratings and school grades	N-90, S-100, F-80, M-80	.33	Conc.
289. Painter, Automobile, 845.781	Employees	55	55	0	38.9	9.2	11.7	1.6	197.2	100.1	1967	Supervisory ratings	S-80, K-90, M-80	.46	Conc.
290. Pairer, 684.687	Employees	58	0	58	32.9	6.4	10.3	1.7	130.4	62.5	1954	Production records	P-90, F-90, M-75	.36	Conc.
291. Pantographer, 979.782	Employees	50	4	46	27.8	8.3	8.8	2.0	30.0	23.2	1956	Supervisory ratings	P-80, K-70, F-70	.45	Conc.
292. Pants Presser, 363.782	Employees	50	29	21	25.6	7.8	10.5	1.7	11.7	11.5	1967	Supervisory ratings	P-80, Q-95, M-85	.45	Conc.
293. Paper Sorter and Counter, 649.687	Employees	59	0	59	30.3	10.5	10.3	1.9	52.3	60.8	1956	Supervisory ratings	P-80, K-90, F-75, M-80	.58	Conc.
294. Parking Enforcement Officer, 375.588	Employees	56	1	55	38.6	7.8	11.8	1.1	36.3	30.4	1968	Supervisory ratings	G-75, V-80, Q-105	.50	Conc.

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[14] N=31

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
295. Part Programmer, Numerical Control II, 007.187	Employees	57	56	1	35.3	8.5	13.6	1.9	36.4	21.6	1967	Supervisory ratings	G–110, V–105, N–105	.43	Conc.
296. Paster, 773.884 Tile Placer, 573.887 Tile Sorter, 573.687	Employees	127	0	127	35.8	8.0	9.6	1.8	53.2	42.2	1955	Supervisory ratings and production records	P–70, F–70, M–80	.44	Conc.
297. Patrolman, 375.268	Validation Sample: Employees	166	166	0	32.8	6.1	13.2	1.7	90.1	57.2	1961	Supervisory ratings	G–95, P–100, Q–90	.22	Conc.
	Cross Validation Sample: Employees	64	64	0	37.2	5.9	11.5	1.6	129.8	59.4	1962	Supervisory ratings	G–95, P–100, Q–90	.30	Conc.
298. Patternmaker, Metal, 600.280 Patternmaker, Wood, 661.281	Employees	111	111	0	37.6	11.7	11.0	1.8	188.8	150.8	1957	Supervisory ratings	N–90, S–100, P–80	.45	Conc.
299. Peeling-and-Coring-Machine Operator, 529.886	Employees	54	0	54	37.4	6.4	8.5	1.7	96.7	54.1	1956	Supervisory ratings	F–75, M–75	.47	Conc.
300. Pharmacist, 074.181	Students	64	57	7	23.5	.9	......	......	......	......	1966	Grade-point averages	G–110, N–120, Q–115	.42	Conc.
301. Photograph Finisher I, 976.886	Employees	59	0	59	32.0	10.8	11.8	1.2	31.4	22.6	1969	Supervisory ratings	V–90, P–75	.36	Conc.
302. Photographer, Lithographic, 972.382	Employees	55	55	0	37.5	8.3	11.5	1.5	176.9	108.4	1961	Supervisory ratings	N–90, S–85, P–95, K–85	.37	Conc.
303. Photo-Offset Lithography, 97–.	Students	105	105	0	20.3	5.0	12.0	.6	None	None	1968	Grade-point averages	N–90, S–95, M–95	.33	Pred.
304. Physical Therapist, 079.378	Validation Sample: Students	122	64	58	23.7	3.9	15.0	.8	None	None	1966	Grade-point averages	G–105, V–105, S–90	.33	Pred.
	Cross Validation Sample I: Employees	88	23	65	33.3	9.6	16.7	1.0	73.5	70.2	1964	Supervisory ratings	G–105, V–105, S–90	.24	Conc.
	Cross Validation Sample II: Students	102	11	91	22.2	1.0	16.0	.0	None	None	1964	Grade-point averages	G–105, V–105, S–90	.19	Conc.
305. Pilot-Control Operator, 559.782	Employees	42	42	0	30.5[16]	7.6	12.0	1.1	33.0	22.0	1950	Supervisory ratings	G–110, V–105, N–110, S–100	.38	Conc.
306. Pinsetter Mechanic, Automatic, 829.281	Trainees	83	83	0	37.7	10.4	11.4	1.9	None	None	1963	Classroom ratings and field ratings	N–85, S–85, F–80	.59	Pred.
307. Plasterer, 842.781	Apprentices	66	66	0	22.7	2.7	11.1	1.3	31.6	8.2	1963	Instructors' ratings	N–80, P–85, M–100	.50	Conc.
308. Plastic Trimmer, 712.887 Inserter, 712.884	Employees	100	0	100	37.2	10.6	10.7	1.7	119.8	99.1	1966	Supervisory ratings	N–85, P–95, M–85	.46	Conc.

309. Plumber, 862.381 Pipe Fitter, 862.381	Validation Sample: Apprentices	322	322	0	23.1	4.3	11.1	1.8	31.9	16.6	1954	Supervisory ratings	N-85, S-80, Q-75, M-80	.30	Conc.
	Cross Validation Sample I: Employees	89	89	0	37.3	8.3	10.2	2.1	126.0	91.2	1954	Supervisory ratings	N-85, S-80, Q-75, M-80	.25	Conc.
310. Polisher, 700.887	Employees	57	57	0	44.9	10.3	9.7	2.1	227.3	120.3	1968	Supervisory ratings	S-75, P-65, Q-80	.26	Conc.
311. Poultry-Dressing Worker, 525.887	Employees	72	0	72	35.5	10.7	9.0	2.0	30.0	24.0	1952	Supervisory ratings	F-80, M-80	.31	Conc.
312. Power-Lawn-Mower Assembler, 706.884	Applicants	52	52	0	29.3	7.5	11.4	1.8	None	None	1958	Supervisory ratings	G-100, S-85, P-85, M-80	.56	Pred.
313. Power-Plant Operator I, 952.782	Students	54	54	0	18.1	1.1	10.7	1.0	None	None	1952	School grades	S-85, F-80, M-80	.54	Pred.
314. Precision-Lens Grinder, 675.380	Employees	52	49	3	38.9	10.3	11.6	1.5	147.5	101.1	1965	Supervisory ratings	S-95, P-80, M-75	.32	Conc.
315. Presser, Hand, 363.884 Silk Finisher, 363.781	Employees	93	2	91	33.7	10.6	10.2	1.9	55.2	44.4	1956	Supervisory ratings and production records	Q-80, K-80, F-75, M-90	.50	Conc.
316. Presser, Machine, 363.782	Employees	51	0	51	39.1	8.9	9.3	2.0	73.1	53.5	1957	Supervisory ratings	K-80, F-70, M-80	.33	Conc.
317. Pressman, 559.885 Pressman, O-Rings, 559.885	Validation Sample: Employees	64	64	0	28.3	7.5	11.4	1.1	36.1	50.7	1969	Supervisory ratings	P-80, M-85	.26	Pred.
	Cross Validation Sample: Employees	30	30	0	41.0	9.9	10.5	1.7	6.8	6.6	1950	Production records	P-80, M-85	.36	Conc.
318. Press Man Occupations, Selected Cylinder Press Man, 651.782 Embossings-Press Operator, 659.782 Engraving-Press Operator, 651.782 Offset-Press Man, 651.782 Overlay Cutter, 651.381 Platen-Press Man, 651.782 Web-Press Man, 651.782	Validation Sample: Employees	112	112	0	35.6	8.1	10.3	1.8	160.4	97.5	1956	Supervisory ratings	N-85, S-85, P-85	.26	Conc.
	Cross Validation Sample I: Applicants	48	48	0	22.7	3.9	11.6	1.0	None	None	1950	Supervisory ratings	N-85, S-85, P-85	.34	Pred.
	Cross Validation Sample II: Employees	32	32	0	35.6	6.1	10.6	1.4	84.1	89.2	1953	Supervisory ratings	N-85, S-85, P-85	.37	Conc.
	Cross Validation Sample III: Apprentices	50	50	0	33.8	6.8	10.4	1.7	....	....	1955	Supervisory ratings	N-85, S-85, P-85	.18	Conc.
	Cross Validation Sample IV. Employees	51	51	0	30.4	5.6	10.2	1.7	72.9	39.4	1956	Supervisory ratings	N-85, S-85, P-85	.38	Conc.
319. Press Operator, 575.380	Applicants	51	51	0	28.9	6.6	11.3	1.2	None	None	1959	Supervisory ratings	G-90, N-100, F-70, M-95	.64	Pred.
320. Printed-Napkin-Machine Operator, 649.885	Employees	55	55	0	28.4	7.4	11.1	1.6	31.0	30.9	1965	Supervisory ratings	S-90, Q-85, K-80, F-75	.49	Conc.
321. Printer-Slotter Operator, 651.782	Employees	70	70	0	32.2	7.2	10.9	1.8	61.0	67.4	1965	Supervisory ratings	P-75, F-80, M-85	.51	Conc.
322. Printing Curricula, 65XX; 97XX	Students	70	70	0	21.5	3.2	14.3	.6	None	None	1967	Grade-point averages	G-90, Q-110, F-80	.42	Conc.
323. Process Artist, 972.281	Employees	66	66	0	37.1	8.6	12.3	1.6	158.5	108.7	1961	Supervisory ratings	S-90, Q-95, K-80	.24	Conc.
324. Process Inspector, 736.381	Employees	57	57	0	35.9	8.3	12.2	1.7	44.5	26.1	1963	Supervisory ratings	N-100, S-100, P-95	.74	Conc.
325. Processor, Solid Propellant, 590.884	Employees	59	59	0	32.2	7.1	11.8	1.1	56.1	17.1	1963	Supervisory ratings	P-70, Q-80, M-85	.56	Conc.

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[a] N-41.

***Table 9–1. Validity of Norms for Specific Occupations*—Continued.**

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
326. Production-Machine Operator, 609.885	Validation Sample: Employees	50	50	0	36.6	8.7	10.1	1.9	78.4	78.8	1957	Supervisory ratings	G–75, F–75, M–80	.38	Conc.
	Cross Validation Sample: Trainees	82	82	0	26.1	9.3	11.0	1.5	......	......	1966	Instructors' ratings	G–75, F–75, M–80	.38	Pred.
327. Production, Mechanic, Tin Cans, 619.380	Employees and Trainees	66	66	0	36.7	5.2	11.2	1.4	83.2	62.7	1966	Supervisory ratings	G–90, S–90, F–90	.36	Conc.
328. Programmer, Business, 020.188	Validation Sample: Employees	102	82	20	29.7	6.7	14.4	1.8	25.5	21.3	1963	Supervisory ratings	G–115, V–105, N–110, S–105	.33	Conc.
	Cross Validation Sample I: Employees	93	77	16	34.5	7.8	14.2	2.1	30.9	19.6	1963	Supervisory ratings	G–115, V–105, N–110, S–105	.29	Conc.
	Cross Validation Sample II: Employees	62	56	6	32.3	5.6	15.9	.8	50.9	20.9	1967	Supervisory ratings	G–115, V–105, N–110, S–105	.23	Conc.
329. Programmer, Detail, Graphic Arts	Trainees	60	58	2	37.4	9.1	12.3	1.4	None	None	1970	Instructors' ratings	N–95, S–85, K–85	.49	Pred.
330. Programmer, Engineering and Scientific, 020.188	Validation Sample: Employees	72	62	10	29.6	6.1	16.5	1.1	37.5	24.3	1964	Supervisory ratings	G–125, V–110, N–110, S–105	.47	Conc.
	Cross Validation Sample: Employees	45	45	0	31.8	6.6	16.6	1.2	68.7	49.0	1968	Supervisory ratings	G–125, V–110, N–110, S–105	.27	Conc.
331. Proof-Machine Operator, 217.388	Employees	51	0	51	24.2	5.6	12.0	.3	57.5	38.8	1961	Production records	Q–105, K–105, F–95	.37	Conc.
332. Proprietor-Manager, Retail Automotive Service, 185.168	Owner-Employees	80	80	0	41.7	9.0	11.2	2.0	85.9	71.3	1963	Supervisory ratings	G–95, N–85, Q–85	.49	Conc.
333. Psychiatric Aid, 355.878	Validation Sample: Employees	241	72	169	41.1	11.4	10.5	1.9	56.6	44.6	1962	Supervisory ratings	G–85, V–75, Q–80	.33	Conc.
	Cross Validation Sample I: Trainees	110	33	77	28.6	10.5	12.2	.8	None	None	1964	Course grades	G–85, V–75, Q–80	.15	Pred.
	Cross Validation Sample II: Employees	55	22	33	44.4	12.6	11.1	2.1	78.5	73.5	1961	Supervisory ratings	G–85, V–75, Q–80	.36	Conc.
334. Psychiatric Technician, 079.368	Trainees	73	34	39	25.3	7.5	12.1	.7	None	None	1964	Training course grades	G–90, V–100, Q–85, K–85	.34	Pred.
335. Punch-Press Operator I, 615.782	Employees	52	0	52	25.5	4.6	10.2	1.7	9.8	7.0	1953	Supervisory ratings	P–75, M–90	.39	Conc.
336. Quality Control Worker, 529.387	Employees	63	0	63	27.7	10.5	12.6	1.8	29.8	45.5	1967	Supervisory ratings	N–95, P–110, F–90	.45	Conc.
337. Radiation Monitor, 199.187	Employees	55	55	0	35.3	9.2	13.7	1.6	77.9	56.0	1967	Supervisory ratings	G–105, N–95, Q–100	.27	Conc.

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338. Radiographer, 199.381	Validation Sample: Employees	48	48	0	31.7	7.2	12.4	1.0	60.0	39.6	1966	Supervisory ratings	P-85, Q-95, F-80	.51	Conc.
	Cross Validation Sample: Employees	30	30	0	39.2	9.1	11.5	3.5	54.6	41.5	1967	Supervisory ratings	P-85, Q-95, F-80	.32	Conc.
339. Radiologic Technologist, 078.368	Validation Sample: Employees	75	16	59	28.3	7.3	13.1	1.5	80.3	54.8	1955	Supervisory ratings	G-95, V-95, S-80	.44	Conc.
	Cross Validation Sample I: Employees	62	36	36	29.6	5.7	13.8	1.4	70.4	41.3	1962	Supervisory ratings	G-95, V-95, S-80	.44	Conc.
	Cross Validation Sample II: Employees	50	15	35	22.7	3.3	14.2	.7	31.1	18.1	1967	Supervisory ratings	G-95, V-95, S-80	.28	Conc.
	Cross Validation Sample III: Students	40	16	24	19.3	2.0	12.2	.5	12.0	7.2	1961	Supervisory ratings and course grades	G-95, V-95, S-80	.12	Conc.
340. Radio-Receiver Assembler, 720.884	Employees	50	0	59	33.5	8.7	9.8	1.8	40.0	40.8	1958	Supervisory ratings	K-95, F-75, M-80	.31	Conc.
341. Radio Repairman, 720.281 Television Service-and-Repairman, 720.281	Validation Sample: Employees	66	66	0	35.9	8.2	12.7	1.4	130.6	81.9	1969	Supervisory ratings	N-80, S-95, F-80	.43	Conc.
	Cross Validation Sample: Students	127	127	0	......	......	......	......	......	......	1956	School grades	N-80, S-95, F-80	.23	Conc.
342. Record-Press Tender, 556.885	Employees	50	38	12	31.0	6.8	10.0	1.8	57.2	41.3	1953	Production records	P-90, M-100	.42	Conc.
343. Refrigeration and Heating Mechanic, 637.251	Students	66	66	0	22.0	2.5	14.1	.4	None	None	1967	Grade-point averages	N-100, Q-95, M-85	.35	Conc.
344. Reproduction Specialist, 97XX	Validation Sample: Trainees	79	62	17	27.6	9.0	12.1	.9	......	......	1966	Supervisory ratings	G-90, N-80, S-90	.50	Pred.
	Cross Validation Sample: Students	41	41	0	17.4	.7	11.0	.0	None	None	1966	Scores on Ohio Printing Achievement Test	G-90, N-80, S-90	.28	Pred.
345. Resistor Winder, 724.884	Employees	50	0	50	28.2	9.8	11.7	1.2	13.4	18.7	1961	Supervisory ratings	G-85, K-100, F-110	.39	Conc.
346. Rewinder Operator, 640.885	Employees	87	87	0	35.3	10.4	11.1	1.8	101.0	109.8	1968	Supervisory ratings	S-70, P-90, M-80	.41	Conc.
347. Rifter, 571.884	Employees	38	0	38	36.8	12.9	9.9	2.6	12.1	3.8	1945	Supervisory ratings	S-85, P-75, K-80, M-75	.52	Conc.
348. Ring Maker III, 700.884	Applicants	55	17	38	28.7	9.0	11.1	1.8	None	None	1957	Supervisory ratings	P-80, M-75	.53	Pred.
349. Rolling Mills Jobs Guide Setter, 613.381 Manipulator, 613.782 Screw-Down Operator, 613.782	Applicants	70	70	0	25.6	5.9	11.5	1.2	None	None	1965	Supervisory ratings	P-95, K-80, M-105	.40	Pred.
350. Room Clerk, 242.368 Hotel Clerk, 242.368	Employees	54	19	35	35.1	10.6	12.4	1.3	18.9	21.0	1964	Supervisory ratings	G-95, N-100, Q-100	.32	Conc.
351. Rotary-Driller Helper, 930.884	Trainees	53	53	0	22.8	5.2	11.5	1.4	None	None	1964	Instructors' ratings	S-85, P-95, M-85	.52	Pred.
352. Routeman, Retail Dairy Products, 292.358	Employees	61	61	0	39.0	9.1	11.6	1.8	84.5	82.6	1960	Supervisory ratings	G-85, N-105, Q-80	.27	Conc.
353. Routeman, Wholesale Dairy Products, 292.358	Employees	110	110	0	35.1	7.4	11.8	1.2	65.8	60.0	1960	Supervisory ratings	G-95, N-110, Q-85	.28	Conc.
354. Sales Clerk, 290.478	Employees	59	0	59	30.5	11.8	10.8	1.4	60.4	64.3	1959	Supervisory ratings	V-85, N-80, K-85	.45	Conc.

***Table 9–1. Validity of Norms for Specific Occupations*—Continued.**

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
355. Salesman, Construction Machinery, 276.358	Employees	113	113	0	40.2	7.6	13.3	2.0	114.0	68.2	1959	Supervisory ratings	G–100, V–95, S–105	.29	Conc.
356. Salesman, Real Estate, 250.358	Employees	52	52	0	44.7	9.6	13.0	1.6	71.4	44.7	1962	Supervisory ratings	G–110, V–100, N–95, Q–90	.35	Conc.
357. Salesperson, General, 289.458	Employees	96	7	89	38.6	9.7	11.1	1.7	43.1	39.6	1959	Supervisory ratings	G–85, N–85, Q–85	.38	Conc.
358. Scrapper, 794.887	Applicants	53	53	0	23.7	4.1	10.8	1.9	None	None	1955	Supervisory ratings	P–95, M–85	.44	Pred.
359. Seamer, 787.782	Employees	200	0	200	29.8	7.8	10.2	1.8	59.2	39.2	1956	Production records	P–80, K–90, F–80, M–80	.44	Conc.
360. Seamless-Hosiery Knitter, 684.885	Employees	54	6	48	30.2	6.8	8.4	1.6	26.6	22.4	1957	Supervisory ratings	P–75, F–70, M–75	.32	Conc.
361. Seamstress, 782.884 Dry Cleaner, Hand, 362.884 Inspector, 369.687 Shirt Presser, 363.885 Wool Presser, 363.782	Employees	33	8	25	37.5	10.2	9.4	2.6	41.2	50.2	1951	Supervisory ratings	F–65, M–75	.47	Conc.
362. Seamstress, 785.381	Students	55	0	55	17.1	.9	11.0	0	None	None	1954	School grades	S–85, P–90, F–85	.44	Conc.
363. Second Helper-Open Hearth, 512.884	Applicants	55	55	0	23.7	4.6	11.1	1.3	None	None	1965	Supervisory ratings	P–95, K–80, M–90	.43	Pred.
364. Selector, 579.687	Applicants	51	0	51	35.4	8.6	10.7	1.5	None	None	1959	Supervisory ratings	P–75, Q–95, K–80	.40	Pred.
365. Service Engineer, 626.251	Employees	50	50	0	32.3	7.6	11.7	1.4	24.4	20.2	1960	Supervisory ratings	G–95, S–85, M–85	.58	Pred.
366. Set-Up Man, Sheet Metal, 616.380	Employees	52	52	0	43.5	9.2	10.1	1.9	112.8	71.8	1967	Supervisory ratings	P–80, Q–90, M–90	.54	Conc.
367. Sewing Machine Operators, Selected Sewing Machine Operator, Lingerie, 786.782 Sewing Machine Operator, Men's Tailored Garments, 786.782 Sewing Machine Operator, Regular Equipment, 786.782 Sewing Machine Operator, Style Garments, 786.782 Sewing Machine Operator, Regular Equipment, 787.782 Straw-Hat-Machine Operators, 787.782 Glove Sewer, 787.782	Validation Sample: Employees	133	0	133	29.6	7.7	8.8	2.0	72.1[16]	67.5[16]	1950	Supervisory ratings and production records	P–75, K–75, F–80, M–75	.25	Conc.
	Cross Validation Sample I: Employees	156	0	156	34.6	12.9	9.6	2.2	75.1	104.7	1950	Supervisory ratings and production records	P–75, K–75, F–80, M–75	.26[17]	Conc.
	Cross Validation Sample II: Employees	58	0	58	27.9	6.0	10.1	1.5	32.8	20.0	1956	Production records	P–75, K–75, F–80, M–75	.30	Conc.
	Cross Validation Sample III: Employees	75	0	75	44.9	12.0	10.3	1.5	102.8	80.8	1967	Production records	P–75, K–75, F–80, M–75	.26	Conc.

368. Sewing-Machine Repairman, 639.281	Employees	73	73	0	37.5	10.4	10.2	1.9	122.7	109.8	1964	Supervisory ratings	S-70, N-85	.42	Conc.
369. Sheet-Metal Worker, 804.281	Apprentices	79	79	0	25.0	4.6	10.4	1.8	None	None	1955	School grades	S-90, Q-80, K-75, M-95	.51	Conc.
370. Shipfitter, 806.381	Employees	62	62	0	34.4	3.5	11.4	1.4	96.4	29.5	1953	Supervisory ratings	S-105, P-75, M-85	.47	Conc.
371. Shrimp Picker, 529.886	Employees	51	0	51	41.5	10.3	9.8	2.1	16.3	16.1	1962	Average hourly earnings	K-85, M-85	.48	Conc.
372. Snipper-Belt Sorter, 529.687	Applicants	53	0	53	23.1	9.9	11.5	1.1	12.8	7.8	1963	Supervisory ratings	P-85, K-85, F-95	.39	Conc.
373. Sociologist, 054.088	Students	51	21	30	23.3	4.0	15.3	.5	......	......	1962	Grade-point averages	G-115, V-110	.29	Conc.
374. Solderer, Production Line, 814.884	Employees	50	43	7	25.0	6.6	11.5	1.1	10.5	2.8	1957	Supervisory ratings	P-90, F-85, M-85	.59	Conc.
375. Spinner, Ring Frame, 682.885	Employees	60	0	60	32.1	6.9	9.2	2.0	101.8	69.2	1953	Supervisory ratings	P-70, K-80, F-75, M-85	.33	Conc.
376. Spooler Operator, Automatic, 689.886	Employees	52	0	52	43.5	12.1	9.3	1.8	178.4	144.3	1964	Supervisory ratings	S-65, P-65, Q-85	.35	Conc.
377. Spot-Welder Feeder, 819.886	Employees	50	0	50	29.2	8.7	10.6	1.7	13.6	14.7	1955	Production records	K-80, F-85, M-75	.38	Conc.
378. Stacker, 774.884	Employees	53	0	53	34.2	7.7	10.1	1.9	40.1	38.9	1966	Supervisory ratings	K-85, F-90	.30	Conc.
379. Stationary Engineer, 950.782	Employees	50	50	0	42.1	9.4	11.6	2.3	155.9	96.7	1963	Supervisory ratings	N-80, S-90, Q-75, K-80	.30	Conc.
380. Steam-Power-Plant Operator, 952.782	Employees	120	120	0	40.4	10.3	12.0	1.3	71.9	48.6	1964	Supervisory ratings	N-85, S-85, K-85, F-75	.40	Conc.
381. Stemmer, Hand, 521.887	Employees	50	0	50	27.1	5.5	9.8	1.7	39.1	30.7	1954	Production records	F-80, M-65	.38	Conc.
382. Stemmer, Machine, 521.885	Employees	71	0	71	24.2	6.9	9.6	1.7	14.3	13.9	1954	Supervisory ratings and production records	K-80, F-70, M-70	.42	Conc.
383. Stenographer, 202.388 Typist, 203.588 Clerk-Typist, 209.388	Validation Sample: Students	130	....	....	......	......	12.0	0	None	None	1949	Work sample	G-95, P-100, Q-100, K-100	.20	Conc.
	Cross Validation Sample I: Students	60	....	....	16.0	.7	11.3	.4	None	None	1951	Work sample	G-95, P-100, Q-100, K-100	.44	Conc.
	Cross Validation Sample II: Students	50	0	50	16.7	.6	11.3	.5	None	None	1951	Work sample	G-95, P-100, Q-100, K-100	.35	Conc.
	Cross Validation Sample III: Students	58	4	54	17.7	.5	12.0	.2	None	None	1951	Work sample	G-95, P-100, Q-100, K-100	.28	Conc.
	Cross Validation Sample IV: Employees	51	0	51	34.0	11.0	12.7	1.2	107.3	79.9	1967	Supervisory ratings	G-95, P-100, Q-100, K-100	.21	Conc.
	Cross Validation Sample V: Students	51	0	51	15.4	.3	9.0	.0	None	None	1966	Grade-point averages	G-95, P-100, Q-100, K-100	.34	Pred.
384. Stereotyper, 975.782	Employees	50	50	0	41.1	10.1	11.0	1.5	237.8	129.5	1960	Supervisory ratings	N-80, S-80, Q-85, K-85	.56	Conc.
385. Stillman, 542.280	Employees	63	63	0	46.4	4.5	10.1	2.4	169.7	53.9	1954	Supervisory ratings	G-85, P-65, K-70, M-65	.49	Conc.

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[16] N=128.

[17] N=148.

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
386. Stitcher, Standard Machine, 690.782	Trainees	51	0	51	31.7	8.4	10.4	1.6	None	None	1964	Supervisory ratings	Q–85, K–95, F–70	.39	Conc.
387. Stock Chaser	Employees	51	51	0	31.4	8.1	10.9	2.7	50.4	32.4	1954	Supervisory ratings	G–75, N–70, Q–80	.44	Conc.
388. Stock Clerk, 223.387	Employees	31	0	31	25.4	6.2	12.4	1.6	9.7	6.6	1945	Supervisory ratings	N–75, Q–75, F–65, M–80	.44	Conc.
389. Stocking Inspector I, 684.684	Employees	57	0	57	33.6	7.0	9.5	1.7	114.9	66.9	1954	Work sample	Q–90, K–90, M–85	.35	Conc.
390. Stripper, 971.381	Employees	53	49	4	34.9	7.2	12.2	1.3	106.2	46.5	1958	Supervisory ratings	N–85, S–90, P–95	.56	Conc.
391. Structural-Shipping Yard Jobs Electric-Bridge-Crane Operator, 921.883 Slipmaker, 619.387 Gag-Press Straightener, 617.782 Gasoline-Truck Operator, 922.883 Crane Follower, 892.883	Validation Sample: Applicants	82	82	0	22.4	2.4	11.7	1.1	None	None	1965	Supervisory ratings	N–90, Q–100, M–95	.33	Pred.
	Cross Validation Sample: Applicants	86	86	0	22.2	2.3	11.7	1.0	None	None	1965	Supervisory ratings	N–90, Q–100, M–95	.31	Pred.
392. Structural-Steel Lay-Out Man, 809.281	Trainees	50	50	0	28.8	6.3	11.6	1.2	None	None	1964	Instructors' ratings	S–100, P–95, Q–90	.41	Pred.
393. Substation Operator, 952.782 Switchboard Operator, 952.782 Turbine Operator, 952.782	Employees	102	102	0	45.8	10.4	12.4	1.5	151.1	100.8	1963	Supervisory ratings	N–80, Q–90, M–70	.37	Conc.
394. Surgical Technician, 079.378	Validation Sample: Employees	50	1	49	22.9	5.9	12.0	.7	16.5	14.0	1961	Supervisory ratings	G–85, S–80, M–90	.53	Conc.
	Cross Validation Sample: Employees	52	1	51	28.3	9.4	11.6	1.1	37.2	37.1	1962	Supervisory ratings	G–85, S–80, M–90	.28	Conc.
395. Surveyor, 018.188	Employees	62	62	0	37.1	7.8	13.0	1.5	9.1	5.3	1964	Supervisory ratings	N–110, S–100, Q–95, K–80	.59	Conc.
396. Survey Worker, 249.268	Employees	130	72	58	33.8[18]	9.0	15.2[18]	1.5	....	....	1950	Supervisory ratings	G–105, V–110, N–95, Q–95	.33	Conc.
397. Systems Analyst, Business-Electronic-Data Processing, 012.168	Employees	55	52	3	33.3	7.7	14.3	2.1	33.2	26.5	1963	Supervisory ratings	G–120, V–105, N–110, S–105	.62	Conc.
398. Table Worker, 920.887	Employees	46	0	46	25.8	7.8	10.4	1.7	15.9	20.9	1952	Supervisory ratings	K–95, F–90, M–90	.39	Conc.
399. Tabulating-Machine Operator, 213.782	Employees	203	107	96	28.9	8.1	12.4	1.6	59.3	48.5	1953	Supervisory ratings	G–95, N–95, S–85, Q–100	.24	Conc.
400. Take-Off Man, 929.887	Applicants	52	52	0	24.7	4.5	11.5	1.4	None	None	1955	Supervisory ratings	P–95, N–85	.64	Pred.
401. Tea-Bag Operator, 920.885	Employees	56	0	56	34.1	6.6	10.6	1.8	63.4	30.4	1964	Supervisory ratings	G–80, F–80, M–90	.56	Pred.
402. Tea-Bag Packer, 920.887	Applicants	57	0	57	25.2	4.8	10.3	1.4	None	None	1953	Supervisory ratings	K–95, F–75	.39	Conc.

403. Teacher Aid, Elementary School, 099.368	Employees	78	1	77	32.6	9.8	12.8	1.2	....	....	1967	Supervisory ratings	N-75, Q-95, K-80	.43	Conc.
404. Teacher, Elementary School, 092.228	Validation Sample: Students	234	....	....	......	......	16.0	0	None	None	1959	Grade-point averages	G-110, V-105, N-95, Q-95	.31	Conc.
Teacher, Secondary School, 091.228	Cross Validation Sample:	263	63	200	21.7	5.2	......	......	None	None	1963	Grade-point averages	G-110, V-105, N-95, Q-95	.29	Pred.
405. Teacher, Nursery School, 359.878	Students	83	0	83	18.3	......	......	......	None	None	1949	School grades	G-100, V-105	.26	Conc.
406. Telephone Ad-Taker, 249.368	Employees	60	60	0	37.5	12.4	12.1	1.2	34.6	40.2	1963	Supervisory ratings	G-90, Q-90, K-100	.27	Conc.
407. Telephone-Answering-Service Operator, 235.862	Employees	56	0	56	37.0	10.5	11.7	1.5	34.3	44.0	1960	Supervisory ratings	V-80, Q-90, K-100	.28	Conc.
408. Teller, 212.368	Validation Sample: Employees	50	9	41	31.3	8.5	12.6	.9	31.0	25.9	1962	Supervisory ratings	G-90, Q-105, F-100	.71	Conc.
	Cross Validation Sample: Employees	50	7	43	31.8	9.7	12.3	1.2	55.3	32.0	1961	Supervisory ratings	G-90, Q-105, F-100	.25	Conc.
409. Ticket Agent, 919.368	Employees	55	34	21	25.6	4.6	12.3	1.0	28.0	20.6	1958	Supervisory ratings	G-95, V-105, N-90	.51	Conc.
410. Tire Builder, Automobile, 750.884	Employees	50	50	0	35.1	8.2	11.1	1.8	91.3	69.8	1963	Supervisory ratings	G-85, P-95, K-80, M-85	.38	Conc.
411. Tomato Peeler, 529.887	Employees	61	0	61	31.0	9.8	......	......	....	....	1953	Supervisory ratings	F-80, M-75	.35	Conc.
412. Tool-and-Die Maker, 601.280	Validation Sample: Apprentices	63	63	0	25.4	3.3	12.1	.8	....	....	1960	Supervisory ratings	N-95, S-100, P-90	.48	Conc.
	Cross Validation Sample I: Apprentices	59	59	0	25.2	3.1	11.9	.9	....	....	1955	Grade-point averages	N-95, S-100, P-90	.40	Conc.
	Cross Validation Sample II: Applicants	124	124	0	23.5	4.0	12.1	.8	10.1	7.2	1956	Supervisory ratings	N-95, S-100, P-90	.42	Pred.
413. Tractor-Trailer Truck Driver, 904.883	Validation Sample: Employees	50	50	0	37.8	6.0	10.8	1.8	59.8	44.5	1957	Supervisory ratings	G-85, V-80, N-90, Q-80	.50	Conc.
Trailer-Tank-Truck Driver, 903.883	Cross Validation Sample: Trainees	92	92	0	29.6	5.4	10.9	1.4	....	....	1966	Instructors' ratings	G-85, V-80, N-90, Q-80	.32	Pred.
414. Traffic Device Maintainer, 869.884	Employees	67	67	0	43.9	6.3	10.3	1.8	78.8	39.6	1968	Supervisory ratings	V-80, Q-70, K-85, M-75	.39	Conc.
415. Trailer Assembler, 806.781	Employees	50	50	0.	38.1	9.7	10.5	2.4	4.3	.1	1962	Supervisory ratings	G-80, S-75, P-70	.47	Conc.
416. Transfer Knitter, 684.782	Employees	52	0	52	27.5	6.9	10.5	2.0	66.1	53.8	1957	Supervisory ratings	S-70, F-90, M-75	.55	Conc.
417. Transferrer I, 972.381	Employees	53	53	0	36.0	8.2	11.8	1.3	162.8	101.6	1961	Supervisory ratings	S-100, Q-90	.30	Conc.
418. Transportation Agent, 912.368	Employees	50	50	0	32.9	11.3	11.5	2.5	58.6	60.6	1965	Supervisory ratings	N-85, Q-85, M-80	.41	Conc.
419. Tricot-Knitting Machine Operator, 685.885	Employees	51	25	26	33.3	8.1	9.1	2.3	72.0	45.8	1958	Supervisory ratings	P-70, F-70, M-85	.28	Conc.
420. Turret-Lathe Set-up Operator, 604.280	Employees	36	36	0	33.8	7.5	10.7	1.5	21.4	23.0	1952	Supervisory ratings	G-80, S-80, P-85, M-80	.52	Conc.
421. Twister-Tender, 681.885	Applicants	61	0	61	24.3	5.3	11.8	1.0	None	None	1969	Supervisory ratings	P-105, Q-95, K-85	.28	Pred.
422. Typesetter-Perforator Operator, 208.588	Employees	183	....	....	33.9	8.7	12.4	1.3	83.8	55.9	1963	Supervisory ratings	G-105, Q-100, K-90	.24	Conc.

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[19] N=106.

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
423. Underwriter, 169.188	Employees	81	81	0	31.0	6.5	14.1	1.8	35.5	30.2	1949	Supervisory ratings	G–120, N–115, Q–105	.27	Conc.
424. Upholster II, 780.884	Validation Sample: Employees	49	40	9	25.6	7.6	9.4	1.9	18.7	16.0	1953	Supervisory ratings	S–80, K–75, F–75, M–85	.46	Conc.
	Cross Validation Sample	41	34	7	27.7	6.8	7.8	1.6	47.5	41.9	1953	Supervisory ratings and production records	S–80, K–75, F–75, M–85	.45	Conc.
425. Vending-Machine Repairman, 639.381	Employees	49	49	0	36.3	9.5	11.6	1.3	68.3	52.5	1967	Supervisory ratings	P–85, Q–85, M–90	.32	Conc.
426. Venetian-Blind Assembler, 739.884	Employees	66	0	66	31.7	9.7	10.4	1.8	53.8	49.7	1960	Supervisory ratings	K–85, F–85, M–85	.54	Conc.
427. Veterinarian, 073.108	Students	72	72	0	27.7	3.8	18.5[19]	.9[19]	None	None	1952	School grades	G–110, S–105, K–100	.45	Conc.
428. Waitress, 311.878	Employees	60	0	60	33.8	8.8	10.8	1.6	108.7	88.0	1959	Supervisory ratings	N–85, M–85	.42	Conc.
429. Waitress II, 311.878	Employees	52	0	52	44.0	10.9	11.1	2.0	71.4	67.9	1963	Supervisory ratings	Q–75, M–80	.30	Conc.
430. Ward Clerk, 219.388	Employees	50	0	50	39.8	12.5	11.9	1.5	33.6	30.5	1960	Supervisory ratings	G–80, V–100, Q–90	.38	Conc.
431. Watch Making Jobs, Balance Wheel Assembly Department Balance Truer II, 715.885 Balance-Wheel-and-Impulse-Pin Subassembler, 715.887 Wheel Inspector, 715.387 Hairspring Solderer, 715.887 Hairspring Vibrator, 715.381 Inspector, Balance Wheel and Impulse Pin, 715.687 Put-in-Beat Adjuster, 715.884	Employees	59	0	59	28.6	7.2	10.7	1.5	21.7	21.7	1958	Supervisory ratings	S–90, F–85, M–85	.62	Conc.
432. Watch Making Jobs, Finishing Department Caser, 715.884 Dialer, 715.884 Final Inspector, Movement Assembly, 715.687 Hands Assembler, 715.884 Inspector, Casing, 715.687 Liner-and-Gasket Inserter, 715.887 Lint Remover, 715.887 Sweep-Spring Attacher, 715.887	Employees	60	0	60	29.2	9.4	10.7	1.5	19.6	20.7	1958	Supervisory ratings	K–95, F–85, M–90	.62	Conc.

433. Watch Making Jobs, Movement Assembly Department Balance Assembler, 715.884 Endshake Adjuster, 715.885 Banking Adjuster, 715.781 Hairspring Inspector I, 715.381 Hairspring Pinner, 715.887 Mechanism Assembler, 715.884 Oiler, 715.884 Repairman, 715.281 Timing-Machine Operator, 715.585 Train Inspector, 715.381	Employees	63	0	63	26.9	7.0	10.8	1.4	25.7	23.4	1958	Supervisory ratings	S-85, P-90, F-90	.68	Conc.
434. Watch Making Jobs, Sub-Assembly-Other Department Barrel-Arbor Assembler, 715.887 Burrer, 715.884 Burrer, Machine, 603.885 Lancing Gager, 715.687 Main-Arbor-and-Hook Assembler, 715.887 Pinion Reamer, 715.887 Reamer, 606.885 Retaining-Spring Attacher, 715.887 Rocking-Bar Adjuster, 715.887 Staker, 715.884 Straightener, 709.884 Tray Leader, 715.887	Employees	56	0	56	28.3	7.2	10.9	1.7	24.8	19.4	1958	Supervisory ratings	S-85, P-90, K-80, M-75	.68	Conc.
435. Water Filterer II, 954.782	Employees	51	51	0	49.9	10.4	9.8	1.7	214.3	136.9	1958	Supervisory ratings	G-70, N-80, Q-80	.45	Conc.
436. Water-Treatment-Plant Operator, 954.782 Sewage-Plant Operator, 954.782	Employees	61	61	0	41.2	10.5	11.6	2.0	101.1	76.0	1964	State Board License Examination grades	G-110, V-95, S-100	.45	Conc.
437. Weaver, 683.782	Validation Sample: Employees	57	57	0	25.1	4.2	11.1	1.8	5.1	4.5	1956	Supervisory ratings	S-80, P-80, K-70, F-75	.48	Conc.
	Cross Validation Sample: Employees	37	14	23	36.4	9.3	8.5	2.0	113.4	71.7	1957	Supervisory ratings	S-80, P-80, K-70, F-75	.37	Conc.
438. Weighing-Station Operator, 224.487	Employees	98	98	0	37.3	8.3	11.9	.6	68.8	36.3	1960	Supervisory ratings	G-75, V-75, N-80, Q-80	.57	Conc.
439. Welder Arc, 810.884	Trainees	49	49	0	21.9	6.9	11.6	1.2	....	....	1965	Welding test results	S-85, M-85	.32	Pred.
440. Welder, Combination, 812.884	Validation Sample: Students	84	84	0	24.9	6.3	10.5	1.8	None	None	1957	Instructors' ratings	S-85, F-85, M-80	.62	Conc.
	Cross Validation Sample: Trainees	52	52	0	24.2	6.9	9.7	2.2	None	None	1969	Instructors' ratings	S-85, F-85, M-80	.30	Pred.

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[19] N=33.

Table 9–1. Validity of Norms for Specific Occupations—Continued.

Occupation and Code	Sample	N	Sex		Age (years)		Education (years)		Experience (months)		Date of Study	Criterion	GATB Norms	φ	Type of Validity
			M	F	M	SD	M	SD	M	SD					
441. Welder, Gas-Shielded Arc, 810.884	Employees	50	50	0	38.6	8.8	9.8	1.7	106.5	69.3	1960	Supervisory ratings	G–70, S–80, P–80	.44	Conc.
442. Welder, Production Line, 812.884	Employees	116	116	0	34.5	10.1	10.6	1.8	90.9	71.9	1969	Supervisory ratings	P–70, M–75	.58	Conc.
443. Wire Drawer, 614.782	Employees	50	0	50	36.7	8.7	11.1	1.5	41.1	40.4	1961	Supervisory ratings	P–85, Q–95, M–80	.58	Conc.
444. Woodworking-Machine Operator, 669.782	Employees	59	59	0	37.3	8.7	9.9	1.9	51.7	52.7	1957	Supervisory ratings	G–75, N–75, F–75, M–75	.56	Conc.
445. Wrapper Layer, 529.885 Wrapper-Layer and Examiner, Soft Work, 529.885	Employees	46	0	46	22.6	5.5	10.4	1.7	20.4	27.7	1950	Supervisory ratings	S–75, P–85, F–85, M–80	.31	Conc.
446. Yarn Winder, 681.885	Employees	64	0	64	38.3	8.7	8.7	1.7	92.2	94.0	1966	Supervisory ratings	K–80, F–70, M–95	.31	Conc.

Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations

Occupation	N	M	SD
1. Tomato Peeler, 529.887	61	55	9
2. Mushroom Inspector, 529.886.	74	68	13
3. Battery Loader, 683.886	48	75	14
4. Flatwork Jobs, 363.886	149	75	14
Assembler, 369.687			
Flatwork Catcher, 363.886			
Flatwork Feeder, 363.886			
Flatwork Folder, 363.886			
Trucker, Hand, 929.887			
5. Nut Sorter, 521.887	74	75	11
6. Charwoman, 381.887	83	76	13
Maid, Hospital, 323.887			
Porter I, 381.887			
7. Seamstress, 782.884	33	76	18
Dry Cleaner, Hand, 362.884			
Inspector, 369.687			
Shirt Presser, 363.885			
Wool Presser, 363.782			
8. Braiding-Machine Operator, 689.885.	51	77	16
9. Inspector-Packer, 774.387	50	77	11
10. Balling Machine Operator II, 689.885.	66	78	13
11. Cottage Parent, 355.878	56	78	20
12. Dietary Aid, 317.887	49	78	14
13. Fettler, 779.884	35	78	13
14. Seamless-Hosiery Knitter, 864.885.	54	78	11
15. Bagger, 920.887	50	79	15
Bag Sealer, 920.887			
Weigher II, 224.487			
16. Cook, Short Order, 314.381	46	79	13
17. Doffer, 689.886	89	79	14
18. Metal-Chair Assembler, 739.884.	52	79	11
19. Onion Corer, 529.886	61	79	14
20. Spooler Operator, Automatic, 689.886.	52	79	15
21. Candy Packer, 920.887	75	80	14
22. Card Tender, 680.885	53	80	15
23. Finisher, Hand, 731.887	75	80	12
Toy Assembler, Plastic, 731.887.			
Toy Assembler, Metal, 731.884.			
24. Garment Looper, 689.782	52	80	10
25. Pantographer, 979.782	50	80	12
26. Waitress II, 311.878	52	80	14
27. Yarn Winder, 681.885	64	80	14
28. Machining Operator, Ceramics, 679.885.	51	81	14
29. Tricot-Knitting Machine Operator, 685.885.	51	81	15
30. Assembler, Radiosonde, 722.884.	57	82	12
31. Classifier, 361.687	52	82	17
32. Food Service Worker, II, 317.884.	100	82	13
33. Luggage-Hardware Assembler, 706.884.	51	82	15
34. Machine Attendant, 619.885.	50	82	13
35. Teacher Aid, Elementary School, 099.368.	78	82	14
36. Cable Assembler, 709.884	53	83	16
37. Meat Packaging Occupations, Selected Casing Tier, 529.887.	50	83	15
Packer, Sausage and Weiner, 920.887.			
Scaler, Sliced Bacon, 920.887.			
Tamale Packer, 920.887			
38. Assembler, Medical and Surgical Supplies, 719.885.	113	84	17
39. Boarding-Machine Operator, 589.885.	103	84	13
40. Cement Mason, 844.844	52	84	17
41. Garment Folder, 789.887	55	84	16
42. Spinner, Ring Frame, 682.885.	60	84	13
43. Stemmer, Hand, 521.887	50	84	13
44. Stemmer, Machine, 521.885.	71	84	15
45. Stock Clerk, 223.387	31	84	12
46. Assembler (toys and games), 731.884.	140	85	18

***Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations*—Continued.**

Occupation	N	M	SD
Model-Airplane Assembler, 731.884.			
Toy-Train Assembler, 731.884.			
47. Assembler II, 753.887	50	85	11
48. Candy-Wrapping-Machine Operator, 920.885.	63	85	13
49. Conveyor-Loader, Plastic Toy Parts, 920.887.	48	85	19
50. Die-Casting Machine Operator II, 514.885.	50	85	14
51. Electric-Motor Assembler, 721.884.	60	85	18
52. Linen-Supply Load Builder, 920.687.	50	85	18
53. Polisher, 700.887	57	85	16
54. Poultry-Dressing Worker, 525.887.	72	85	17
55. Welder, Production Line 812.884.	116	85	19
56. Transfer Knitter, 684.782	52	85	13
57. Corrugator Operator, 643.782.	70	86	15
58. Countergirl, 311.878	50	86	13
Counterman, Lunchroom or Coffee Shop, 311.878.			
59. Ladies'-Hat Trimmer, 784.884.	34	86	13
60. Loom Fixer, 683.280	50	86	14
61. Machine Operators, Selected (II)	54	86	17
Cold-Saw Operator, 607.782.			
Cold-Sizing-Mill Operator, 613.782.			
Decambering-Mill Operator, 613.782.			
Flying-Cut-Off-Machine Operator, 619.782.			
Rotary-Straightener-Operator, 613.782.			
Straightener-Machine Operator, 613.782.			
Tube-Straightener Operator, 613.782.			
Welder, Assistant, Pipe Making, 616.380.			
Welder, Pipe Making 616.380.			
62. Punch-Press Operator I, 615.782.	52	86	13
63. Radio-Receiver Assembler, 720.884.	59	86	13
64. Seamer, 787.782	200	86	14
65. Sewing Machine Operators, Selected	422	86	14
Sewing Machine Operator, Lingerie, 786.782.			
Sewing Machine Operator, Men's Tailored Garments, 786.782.			
Sewing Machine Operator, Regular Equipment, 787.782.			
Sewing Machine Operator, Style Garments, 786.782.			
Sewing Machine Operator, Regular Equipment, 787.782.			
Straw-Hat Machine Operator, 787.782.			
Glove Sewer, 787.782			
66. Stocking Inspector I, 684.684.	57	86	13
67. Cannery Worker (Machine Operators), 529.886.	194	87	17
68. Electro-Mechanical Assembly Curriculum, 70XX; 72XX.	50	87	11
69. Fork-Lift-Truck Operator, 922.883.	66	87	12
70. Upholsterer II, 780.884	90	87	14
71. Pants Presser, 363.782	50	87	17
72. Paster, 773.884	127	87	15
Tile Placer, 573.887			
Tile Sorter, 573.687			
73. Stacker, 774.884	53	87	15

***Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations*—Continued.**

Occupation	N	M	SD
74. Table Worker, 920.887	46	87	11
75. Automobile Service Station Mechanic, 620.381.	96	88	15
76. Cannery Worker (Trimmers and Sorters), 529.886.	410	88	17
77. Cementer, Hand, 788.887	54	88	13
78. Container-Maker-Filler-Packer Operator, 920.885.	53	88	13
79. Custodian, School, 381.887	87	88	16
80. Electric Toothbrush Assembler, 723.884.	61	88	11
81. Farm Hand, Dairy I, 411.884.	54	88	18
82. Fireworks Assembler, 737.887.	75	88	15
83. Heat Treater I, 504.782 Heat Treater II, 504.782	78	88	21
84. Iron and Steel Jobs, Laborer, General 509.886. Coil-Opener-and-Down-Ender Operator, 613.782. Conveyor Man II, 921.883. Cooling-Conveyor Operator, 921.883. Tester-Conveyor Operator, 921.883. Thread-Entry-Conveyor Operator, 921.883. Yard-Transfer-Conveyor Operator, 921.883.	64	88	15
85. Levers—Lace Machine Operator, 683.782.	54	88	15
86. Mender, 782.884 Burler, 689.684	52	88	9
87. Merchandise Packer, 920.887.	77	88	14
88. Multi-Moulding Unit Operator, 712.884. Heater Operator, 712.884	66	88	15
89. Presser, Machine, 363.782	51	88	15
90. Nurse Aid, 355.878	354	88	15
91. Sales Clerk, 290.478	59	88	14
92. Seamstress, 785.381	55	88	10
93. Sewing Machine Repairman, 639.281.	73	88	16
94. Tea-Bag Packer, 920.887	57	88	11
95. Wrapper Layer, 529.885 Wrapper-Layer Examiner, Soft Work, 529.885.	46	88	13
96. Aircraft Assembly Occupations, Selected Assembler, Aircraft Structures and Surfaces, 806.381. Assembler, Aircraft Power Plant, 621.381. Aircraft Mechanic, Plumbing and Hydraulic, 862.381. Aircraft Mechanic, Rigging and Controls, 801.381.	52	89	16
97. Assembler, Accessories, 729.887.	55	89	13
98. Bag-Machine Operator, 649.885. Waxed-Bag Machine Operator, 649.885.	55	89	14
99. Baker, 526.781	65	89	12
100. Baser, 692.885 Threader, 725.887	62	89	14
101. Composition Roofer, 866.381.	50	89	15
102. Die Cutter, 699.782	86	89	15
103. Fruit Sorter, 529.687 Cherry Sorter, 529.687 Olive Sorter, 529.687 Packer, 920.887 Apple Packer, 920.887 Cherry Packer, 920.887 Citrus-Fruit Packer, 920.887. Plum Packer, 920.887	327	89	16
104. Maintenance Man, Building, 899.381.	86	89	15
105. Packer, 920.887	58	89	14
106. Plastic Trimmer, 712.887 Inserter, 712.884	100	89	15

***Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations*—Continued.**

Occupation	N	M	SD
107. Presser, Hand, 363.884 Silk Finisher, 363.781.	93	89	17
108. Tea-Bag Operator, 920.885	56	89	14
109. Trailer Assembler, 806.781	50	89	14
110. Welder, Gas Shielded Arc, 810.884.	50	89	16
111. Bindery Worker, 643.885	103	90	16
112. Light-Bulb Assembler, 692.885.	50	90	14
113. Mounter, Color Film, 976.885.	50	90	14
114. Traffic Device Maintainer, 869.884.	67	90	14
115. Assembler, Automobile, 806.887.	72	91	14
116. Assembler, Dry Cell and Battery, 727.887.	94	91	13
117. Carding-Machine Operator, 681.885.	51	91	14
118. Cereal Packer, 920.887	54	91	15
119. Cheese Wrapper and Packer, 920.887.	61	91	14
120. Circular Knitter, 685.885	53	91	15
121. Director, School Lunch Program, 187.168.	87	91	14
122. Electronic-Resistance-Spot-Welder, 726.884.	50	91	15
123. Goggle-Glass Cutter, 713.884. Lens Cutter II, 713.884	50	91	12
124. Inspector, Subassemblies, 726.384.	51	91	16
125. Napkin Packager, 920.885	69	91	14
126. Packager, Solutions and Syringes, 920.885.	32	91	16
127. Painter, Automobile, 845.781.	55	91	16
128. Appliance-Cord Assembler, 723.885.	56	92	15
129. Assembler, Hearing Aid and Detector, 712.884.	51	92	18
130. Body Maker Feeder and Side Seam Tender, 616.884.	49	92	15
131. Capacitor Winder, 726.884	53	92	14
132. Cementer, Life Rafts, 751.887.	56	92	16
133. Coil Assembler, 706.884 Air-Conditioning-Unit Installer, 827.884.	61	92	11
134. Egg Candler, 529.687	52	92	15
135. Envelope-Machine Set-up Man, 641.780.	51	92	15
136. Inspector, 712.887 Inspector, Plastic, 712.687	55	92	12
137. Insulation-Blanket Maker, 809.884.	55	92	16
138. Laborer, Bakery, 524.381	57	92	19
139. Loader, 920.887	55	92	16
140. Marker II, 920.887	60	92	11
141. Paper Sorter and Counter, 649.687.	59	92	13
142. Photograph Finisher I, 976.886.	59	92	18
143. Printer-Slotter Operator, 651.782.	70	92	16
144. Rifter, 571.884	38	92	20
145. Stitcher, Standard Machine, 690.782.	51	92	16
146. Assembler, Microwave Tube, 692.885.	60	93	14
147. Bench Carpenter, 760.884	48	93	18
148. Stock Chaser, 221.387	51	92	15
149. Construction-Equipment Mechanic, 620.281.	50	93	13
150. Core-Plane Wirer, 726.884	50	93	15
151. Fancy Stitcher, 690.782 Top Stitcher, 690.782 Vamp Stitcher, 690.782	113	93	13
152. Micro-Logic Assembler, 726.884	50	93	11
153. Order Filler, 922.887	106	93	13
154. Gasoline Engine Assembler, 806.781. Internal Combustion Engine Assembler, 806.781. Outboard-Motor Assembler, 806.781.	59	93	15

***Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations*—Continued.**

Occupation	N	M	SD
155. Plasterer, 842.781	66	93	15
156. Record-Press Tender, 556.885.	50	93	16
157. Ring Maker III, 700.884	55	93	15
158. Shrimp Picker, 529.886	51	93	20
159. Twister Tender, 681.885	61	93	16
160. Water Filterer II, 954.782	51	93	16
161. Weighing-Station Operator, 224.487.	98	93	14
162. Woodworking-Machine Operator, 669.782.	59	93	17
163. Automobile-Body Repairman, 807.381.	119	94	15
164. Carder, 712.887	58	94	16
Assembler, 712.887			
165. Case Coverer, 739.884	50	94	14
Case Liner, 739.884			
166. Cutting-and-Creasing Pressman, 649.782.	77	94	18
167. Gyroscope Assembler, 710.884.	50	94	14
168. Hand Sewer, Shoes, 788.884.	156	94	16
169. Inspector and Machine Operator, Diode Subassemblies, 726.685.	52	94	15
170. Insulating-Machine Operator, 691.782.	54	94	15
171. Pairer, 684.687	58	94	13
172. Psychiatric Aid, 355.878	406	94	16
173. Spot-Welder Feeder, 819.886.	50	94	15
174. Venetian-Blind Assembler, 739.884.	66	94	13
175. Waitress, 311.878	60	94	17
176. Watchmaking Jobs, Balance Wheel Assembly Department	59	94	18
Balance Truer II, 715.885			
Balance-Wheel-and-Impulse-Pin Subassembler, 715.887.			
Wheel Inspector, 715.387			
Hairspring Solderer, 715.887.			
Hairspring Vibrator, 715.381.			
Inspector, Balance Wheel and Impulse Pin, 715.687.			
Put-in-Beat Adjuster, 715.884.			
177. Welder, Combination, 812.884.	136	94	15
178. Autoclave Operator, 553.782.	52	95	17
179. Blown Plastic Container Machine Operator, 556.885.	58	95	16
180. Bomb-Fuse-Parts Assembler, 737.884.	90	95	12
181. Cosmetologist, 332.271	99	95	14
182. Fish Cleaner, 525.884	51	95	16
183. Fountain Girl, 319.878	100	95	18
184. Gas Serviceman, 637.281	51	95	15
185. Knitting-Machine Fixer, Socks, 689.280.	51	95	15
186. Module Assembler II, 726.884.	102	95	14
187. Mounter I, 726.887	281	95	14
188. Production-Machine Operator, 609.885.	132	95	16
189. Asparagus Sorter, 529.687	136	96	19
190. Automobile-Service-Station Attendant, 915.867.	52	96	17
191. Assembler, Components	55	96	14
192. Barber, 330.371	207	96	16
193. Boilermaker I, 805.281	81	96	14
194. Department Head Buyer, 299.138.	59	96	14
195. Watch-Making Jobs, Sub-Assembly-Other Department	56	96	16
Barrel-Arbor Assembler, 715.887.			
Burrer, 715.884			
Burrer, Machine, 603.885			
Lancing Gager, 715.687			
Main-Arbor-and-Hook Assembler, 715.887.			

Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations—Continued.

Occupation	N	M	SD
Pinion Reamer, 715.887			
Reamer, 606.885			
Retaining-Spring Attacher, 715.887.			
Rocking-Bar Adjuster, 715.887.			
Staker, 715.884			
Straightener, 709.884			
Tray Leader, 715.887			
196. Coil Finisher, 724.887	53	96	15
197. Decorator, Hand, 740.884	70	96	13
198. Dental-Laboratory Technician, 712.381.	164	96	17
199. Garment Packer, 920.887	51	96	15
200. Hosiery Looper, 689.782	87	96	14
201. Metal Fabricator I, 619.380.	51	96	13
202. Nurse, Licensed Practical, 079.378.	205	96	13
203. Packager, Machine, 920.885.	85	96	12
204. Packaging-Machine Mechanic, 920.280.	103	96	16
205. Rewinder Operator, 640.885.	87	96	12
206. Watch-Making Jobs, Movement Assembly Department	63	96	13
Balance Assembler, 715.884.			
Endshake Adjuster, 715.885.			
Banking Adjuster, 715.781			
Hairspring Inspector I, 715.381.			
Hairspring Pinner, 715.887			
Mechanism Assembler, 715.884.			
Oiler, 715.884			
Repairman, 715.281			
Timing-Machine Operator, 715.585.			
Train Inspector, 715.381			
207. Weaver, 683.782	94	96	14
208. Wire Drawer, 614.782	50	96	15
209. Automobile Mechanic, 620.281.	247	97	17
Foreign Car Mechanic, 620.281.			
210. Carton-Forming-Machine Operator, 641.885.	53	97	18
211. Central Office Operator, 235.862.	88	97	13
212. Coil Winder II, 724.884	65	97	14
213. Distribution Clerk, 231.688.	80	97	15
214. Electronics Assembler, 726.281.	204	97	15
215. Exterminator, 389.884	55	97	16
216. Extruding-Machine Operator, 691.782.	84	97	14
217. Flexographic Press Man I, 651.782.	75	97	17
218. Folding-Machine Operator, 653.782.	50	97	15
219. Fourdrinier-Machine Tender, 539.782.	84	97	16
Back Tender, 534.782			
220. Grid Operator, 725.884	63	97	15
221. Maintenance Mechanic II, 638.281.	84	97	15
222. Proof-Machine Operator, 217.388.	51	97	11
223. Set-up Man, Sheet Metal, 616.380.	52	97	17
224. Surgical Technician, 079.378.	102	97	15
225. Coin-Vending Machine Collector, 292.483.	57	98	15
226. Finisher, Hand, 754.884	50	98	16
227. Fishing-Rod Assembler, 723.884.	56	98	16
228. Injection-Molding-Machine Tender, 556.885.	74	98	13
229. Machinery Erector, 638.281.	55	98	14
230. Manufacturers' Service Representative, 638.281.	95	98	15
Millwright, 638.281			
231. Multiple-Photographic-Print Operator, 976.782.	50	98	16

***Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations*—Continued.**

Occupation	N	M	SD
232. Operating Engineer II, 859.883.	92	98	18
233. Parking Enforcement Officer, 375.588.	56	98	14
234. Stillman, 542.280	63	98	16
235. Reproduction Specialist, 97XX.	120	98	12
236. Telephone-Answering-Service Operator, 235.862.	56	98	14
237. Turret-Lathe Set-up Operator, Tool, 604.280.	36	98	16
238. Watch-Making Jobs, Finishing Department	60	98	17
Caser, 715.884			
Dialer, 715.884			
Final Inspector, Movement Assembly, 715.687.			
Hands Assembler, 715.884			
Inspector, Casing, 715.687			
Liner-and-Gasket Inserter, 715.887.			
Lint Remover, 715.887			
Sweep-Spring Attacher, 715.887.			
239. Book-and-Game Line Attendant, 920.887.	59	99	15
240. Carpenter, 860.381	119	99	15
241. Inspectors Selected,	70	99	19
Crusher Inspector, 619.685.			
Mill-End Inspector, 619.687.			
Mill Inspector, 619.387			
Pipe and Coupling Sizer, 619.687.			
Pipe Walker, 619.687			
Thread Inspector, 619.687			
242. Insulation Worker, 863.884.	50	99	16
243. Machine Operator, Mass Mailing, 234.885.	51	99	12
244. Plumber, 862.381	411	99	17
Pipe Fitter, 862.381			
245. Pressman Occupations, Selected	293	99	15
Cylinder Press Man, 651.782.			
Embossing-Press Operator, 659.782.			
Engraving-Press Operator, 651.782.			
Offset-Press Man, 651.782			
Overlay Cutter, 651.381			
Platen-Press Man, 651.782			
Web-Press Man, 651.782			
246. Scrapper, 794.887	53	99	15
247. Selector, 579.687	51	99	12
248. Sheet Metal Worker, 804.281.	79	99	14
249. Tractor-Trailer-Truck Driver, 904.883.	142	99	13
Trailer-Tank-Truck Driver, 903.883.			
250. Boat Loader, 726.884	63	100	11
251. Cable Maker, 726.884	100	100	15
252. Coding Clerk, 219.388	64	100	18
253. Cook, 313.381	160	100	14
254. Electrician, Airplane, 825.281.	51	100	17
Aircraft Mechanic, Armament, 801.381.			
255. Experimental Assembler, 739.381.	61	100	15
256. Firesetter, 692.380	52	100	13
257. Fish and Game Warden, 379.168.	80	100	13
258. Gas-Pump-Computer Assembler, 710.884.	52	100	16
259. General Labor Worker, 899.887.	61	100	14
260. Hospital-Admitting Clerk, 237.368.	59	101	14
261. Manager, Restaurant or Coffee Shop, 187.168.	76	100	17
262. Machine Operators, Selected	51	100	14
Cold-Mill Operator, 613.782			

Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations—Continued.

Occupation	N	M	SD
Hot-Mill Operator, 613.782			
Payoff Operator, 503.885			
Rewind Operator, 509.782			
Slitting-Machine Operator, II, 715.782.			
263. Offset-Web-Press Man, 651.782.	53	100	13
264. Processor Solid Propellant, 590.884.	59	100	16
265. Salesperson, General, 289.458.	96	100	17
266. Solderer, Production Line, 814.884.	50	100	14
267. Key-Punch Operator, 213.582.	193	101	13
268. Meat Cutter, 316.884	169	101	16
269. Pressman, 559.885	94	101	16
Pressman, O-Rings, 559.885			
270. Printed-Napkin-Machine Operator, 649.885.	55	101	16
271. Proprietor-Manager, Retail Automotive, 185.168.	80	101	15
272. Rotary-Driller Helper, 930.884.	53	101	15
273. Transportation Agent, 912.368.	50	101	19
274. Vending Machine Repairman, 639.381.	49	101	15
275. Ward Clerk, 219.388	50	101	14
276. Bakery-Wagon Driver, 292.358.	52	102	15
277. Compression-Moulding-Machine Tender, 556.885.	91	102	16
278. Extruder Operator, 557.782.	57	102	19
279. Ingot Mold Foundry Jobs, Hand Rammer, 518.381.	144	102	11
Sand Slinger Operator, 518.883.			
Knockoutman, 519.887			
280. Lineman, Repair, 821.381	59	102	14
281. Linotype Operator, 650.582.	164	102	13
282. Molded-Goods Inspector-Trimmer, 759.687.	50	102	17
283. Molder Bench, 518.381	53	102	11
284. Tire Builder, Automobile, 750.884.	50	102	17
285. Welder, Arc, 810.884	49	102	16
286. Cabinetmaker, 660.280	81	103	13
287. Die Maker, 739.381	58	103	16
288. Lather, 842.781	64	103	17
289. Pinsetter Mechanic, Automatic, 829.281.	83	103	14
290. Precision Lens Grinder, 675.380.	52	103	16
291. Second Helper-Open Hearth, 502.884.	55	103	13
292. Artificial-Breeding Technician II, 467.384.	59	104	12
293. Employment Clerk, 205.368.	57	104	14
294. Encoder, 209.588	50	104	17
295. Machinist I, 600.280	177	104	16
296. Occupational Therapy Aid, 079.368.	65	104	13
297. Offset-Duplicating Machine Operator, 207.782.	86	104	15
298. Oil-Burner-Installation-and-Serviceman, 826.281.	77	104	14
299. Ornamental-Iron Worker, 809.381.	77	104	16
Structural-Steel Worker, 801.781.			
300. Routeman, Retail Dairy Products, 292.358.	61	104	13
301. Teacher, Nursery School, 359.878.	83	104	11
302. Bookkeeping-Machine-Operator, 215.388.	102	105	12
303. Chemical Operator III, 559.782.	50	105	13
304. Dental Assistant, 079.378	342	105	14
305. Office-Machine Serviceman, 633.281.	117	105	16
Adding-Machine Serviceman, 633.281.			

Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations—Continued.

Occupation	N	M	SD
Calculating-Machine Serviceman, 633.218.			
Cash-Register Serviceman, 633.281.			
Duplicating-Machine Serviceman, 633.281.			
306. Telephone Ad-Taker, 249.368.	60	105	12
307. Power-Plant Operator I, 952.782.	54	105	10
308. Stationary Engineer, 950.782.	50	105	18
309. Resistor Winder, 724.884	50	105	15
310. Airplane Stewardess, 352.878.	76	106	12
311. Clerk, General Office, 219.388.	301	106	14
312. Compositor I, 973.381	107	106	16
313. Electrician, 824.281	253	106	14
314. Fire Fighter, 373.884	60	106	12
315. Inhalation Therapist, 079.368.	81	106	17
316. Log Scaler, 941.488	75	106	16
317. Manager, Store I, 185.168	51	106	13
318. Painter, 840.781	202	106	14
319. Process Artist, 972.281	66	106	14
320. Psychiatric Technician, 079.368.	73	106	13
321. Radiologic Technologist, 078.368.	187	106	15
322. Stenographer, 202.388	400	106	12
Typist, 203.588			
Clerk-Typist, 209.388			
323. Structural Shipping Yard Jobs	168	106	10
Crane Follower, 892.883			
Electric-Bridge-Crane Operator, 921.883			
Gag-Press Straightener, 617.782.			
Gasoline-Truck Operator, 922.883.			
Slipmaker, 719.387			
324. Structural-Steel Lay-Out Man, 809.281.	50	106	14
325. Take-Off Man, 929.887	52	106	16
326. Billet Yard Jobs	80	107	11
Pickler, 503.885			
Scarfer, 816.884			
Chipper I, 705.884			
327. Bricklayer, 861.381	50	107	11
328. Carpet Layer, 299.381	101	107	15
Floor Layer, 864.781			
329. Glazier, 865.781	55	107	14
330. Manager, Retail Food, 185.168.	143	107	15
331. Medical Assistant, 079.368.	49	107	14
332. Photo-Offset Lithography, 97–	105	107	13
333. Press Operator, 575.380	51	107	12
334. Production Mechanic, Tin Cans, 619.380.	66	107	12
335. Rolling Mills Jobs	870	107	12
Guide Setter, 613.381			
Manipulator, 613.782			
Screwdown Operator, 613.782.			
336. Transferrer I, 972.381	53	107	13
337. Copy Holder, 209.588	105	108	16
Proofreader I, 209.688			
338. Food Service Supervisor, 319.138.	50	108	9
339. Instrument Repairman I, 710.281.	123	108	14
340. Intercom Serviceman II, 829.281.	53	108	14
341. Model Maker I, 693.381	62	108	15
342. Photographer, Lithographic, 972.382.	55	108	12
343. Room Clerk, 242.368	54	108	14
Hotel Clerk, 242.368			
344. Stereotyper, 975.782	50	108	18
345. Stripper, 971.381	53	108	13
346. Ticket Agent, 919.368	55	108	14
347. Audit Clerk, 210.388	53	109	14

***Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations*—Continued.**

Occupation	N	M	SD
348. Clerical Occupations, Selected Checker II, 209.688 IBM Coder, 219.388 Inserter, 230.887 Letter-Opener Operator, 231.588 Mail Clerk, 231.588 Sorter, 209.688	66	109	14
349. File Clerk II, 206.388	50	109	14
350. Glass Blower, Laboratory Apparatus, 772.281.	50	109	12
351. Manager, Theatre, 187.168	32	109	12
352. Power-Lawn-Mower Assembler, 706.884.	52	109	13
353. Routeman, Wholesale Dairy Products, 292.358.	110	109	13
354. Service Engineer, 624.251	50	109	12
355. Teller, 212.368	100	109	13
356. Tool-and-Die Maker, 601.280.	246	109	15
357. Water-Treatment-Plant Operator, 954.782.	61	109	14
358. Bookkeeper I, 210.388	66	110	16
359. Clothes Designer	149	110	12
360. Correction Officer, 372.868	51	110	12
361. Diesel Mechanic, 625.281	52	110	12
362. Grocery Checker, 299.468	237	110	14
363. Inspector, Assemblies and Installations, 806.381.	81	110	12
364. Patternmaker, Metal, 600.280. Patternmaker, Wood, 661.281.	111	110	15
365. Radio-Repairman, 720.281 Television Service and Repairman, 720.281.	193	110	16
366. Typesetter-Perforator Operator, 208.588.	183	110	15
367. Calculating-Machine Operator, 216.488.	53	111	14
368. Counterman, Automotive Parts, 289.358.	53	111	11
369. Monotype-Keyboard Operator, 650.582.	52	111	13
370. Patrolman, 375.268	230	111	11
371. Quality Control Worker, 529.387.	63	111	15
372. Snipper-Belt Sorter, 529.687.	53	111	19
373. Tabulating-Machine Operator, 213.782.	203	111	14
374. Steam Power Plant Operator, 952.782.	120	111	13
375. Engineering Aid II, 019.281.	57	112	12
376. Radiographer, 199.381	78	112	15
377. Refrigeration and Heating Mechanic, 637.251.	66	112	12
378. Substation Operator, 952.782. Switchboard Operator, 952.782. Turbine Operator, 952.782	102	112	14
379. Aircraft-and-Engine Mechanic, 621.281.	75	113	14
380. Central-Office Repairman, 822.281.	64	113	16
381. Counselor II, 045.108	53	113	11
382. Engineer, 197.130	64	113	12
383. Forester Aid, 441.384	78	113	10
384. Inspector, Mechanical and Electrical, 710.384.	50	113	16
385. Maintenance Man, Factory or Mill, 899.281.	53	113	11
386. Manager, City Circulation, 163.118.	38	113	12
387. Printing Curricula, 65XX, 97XX.	70	113	11
388. Salesman, Construction Machinery, 276.358.	113	113	14
389. Salesman, Real Estate, 250.358.	52	113	13
390. Electronics Foreman, 726.134.	72	114	14
391. Process Inspector, 736.381	57	114	8
392. Shipfitter, 806.381	62	114	13

***Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations*—Continued.**

Occupation	N	M	SD
393. Teacher, Elementary School, 092.228.	497	114	13
Teacher, Secondary School, 091.228.			
394. Radiation Monitor, 199.187	55	115	15
395. Case Worker, 195.108	106	116	13
396. Claim Adjuster, 241.168	106	116	12
397. Director, Funeral, 187.168	50	116	12
Embalmer, 338.381			
398. Draftsman, Architectural, 001.281.	537	116	12
Draftsman, Civil, 005.281			
Draftsman, Geological, 010.281.			
Draftsman, Mechanical, 007.281.			
Draftsman, Structural, 005.281.			
Detailer, 017.281			
399. Illustrator, 141.081	52	116	11
400. Chemical and Metallurgical Technology-Technical Institute Training, 008. and 011.	55	117	13
401. Computer Technology Trainee, 828.XX.	513	117	13
402. Counselor, Camp, 159.228	155	117	15
403. Digital-Computer Operator, 213.382.	144	117	15
404. Nurse, General Duty, 075.378.	274	117	12
405. Programmer, Detail Graphic Arts, 219.388.	60	117	17
406. Accountant, 160.188	84	118	12
Auditor, 160.188			
407. Air-Traffic-Control Specialist, Tower, 193.168.	152	118	11
408. Credit Man, 168.268	59	118	15
409. Dental Hygienist, 078.368	83	118	10
410. Electronics Technician, 003.181.	97	118	9
411. Electronics Mechanic, 726.281.	50	119	12
412. Medical-Laboratory Assistant, 078.381.	81	119	12
413. Surveyor, 018.188	62	119	16
414. Survey Worker, 249.268	134	119	15
415. Industrial Technology-Technical Institute Training, 012.	52	120	10
416. Librarian, 100.168	366	120	15
417. Metallurgical Technlogy-Technical Institute Training, 011.	59	120	13
418. Physical Therapist, 079.378.	312	120	13
419. Pilot-Control Operator, 559.782.	42	120	12
420. Sociologist, 054.088	51	120	12
421. Dietitian, 077.168	57	121	12
422. Dispatcher, Motor Vehicle, 919.168.	50	121	11
423. Electrical Technology-Technical Institute Training, 003.	63	121	11
424. Occupational Therapist, 079.128.	158	121	11
425. Manager, Industrial Organization, 189.118.	70	122	15
426. Laboratory Tester I, 029.281.	118	123	14
427. Forester, 040.081	80	124	12
428. Job Analyst, 166.088	59	124	10
429. Osteopathic Physician, 071.108.	93	124	12
430. Part Programmer, Numerical Control II, 007.187	57	124	14
431. Biologist, 041.081	50	125	11
432. Veterinarian, 073.108	72	125	10
433. Industrial Chemistry Technology-Technical Institute Training, 012.	55	126	12
434. Mechanical Technology-Technical Institute Training, 007.	55	126	11
435. Medical Technologist, 078.381.	113	126	13

***Table 9–2. Data on Aptitude G (Intelligence) for Specific Occupations*—Continued.**

Occupation	N	M	SD
436. Pharmacist, 074.181	64	127	9
437. Underwriter, 169.188	81	128	12
438. Programmer, Business, 020.188.	257	130	14
439. Dentist, 072.108	177	131	11
440. Systems Analyst, Business, Electronic-Data Processing, 012.168.	55	133	13
441. Engineer, Selected Classifications,	424	135	13
Chemical Engineer, 008.081.			
Civil Engineer, 005.081			
Electrical Engineer, 003.081.			
Mechanical Engineer, 007.081.			
442. Programmer, Engineering and Scientific, 020.188.	72	136	13
443. General Practitioner, 070.108.	49	136	11
444. Mathematician, 020.008	52	143	14

Table 9–3. GATB Data on Aptitudes for Specific Occupations

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
1. Accountant, 160.188	G	115	11	.43**	3.—*Continued*	V	87	16	.16
Auditor, 160.188	V	114	10	.29*	Surfaces, 806.381	N	87	18	.36**
Validation sample	N	118	13	.44**	Assembler, Aircraft	S	93	18	.42**
N=54	S	96	17	.25	Power Plant,	P	87	21	.50**
Supervisory ratings	P	92	14	.34*	621.381	Q	81	14	.56**
	Q	114	15	.43**	Aircraft Mechanic,	K	79	18	.34*
	K	108	18	.12	Plumbing and Hy-	F	91	21	.52**
	F				draulic, 862.381	M	101	22	.55**
	M				Aircraft Mechanic,				
Cross Validation	G	123	13	.51**	Rigging and Con-				
sample	V	116	15	.30	trols, 801.381				
N=30	N	125	12	.68**	*N=52*				
Grade-point averages	S	115	19	.25	4. Airplane Stewardess,	G	106	12	.22*
	P	119	15	.02	352.878	V	108	14	.12
	Q	115	15	.24	*N=76*	N	105	12	.32**
	K	118	15	.02	Supervisory ratings	S	106	16	.04
	F					P	114	13	.12
	M					Q	117	12	.25*
Combined sample	G	118	12	....		K	120	12	.17
N=84	V	115	12	....		F	114	19	−.10
	N	121	13	....		M	115	20	−.02
	S	103	20	....	5. Air-Traffic-Control	G	118	11	.14
	P	102	19	....	Specialist, Tower,	V	114	14	.21**
	Q	114	15	....	193.168	N	115	10	.27**
	K	112	18	....	*N=152*	S	113	17	−.06
	F				Supervisory ratings	P	109	15	.19*
	M					Q	111	11	.08
2. Aircraft-And-Engine	G	113	14	.41**		K	112	15	.06
Mechanic, 621.281	V	105	11	.35**		F	101	17	.11
N=75	N	107	12	.34**		M	106	17	.19*
Grade-point averages	S	120	17	.22	6. Appliance-Cord	G	92	15	.21
	P	106	15	.08	Assembler, 723.885	V	95	16	.00
	Q	106	14	.18	*N=56*	N	91	20	.28*
	K	103	15	.01	Supervisory ratings	S	90	14	.24
	F	107	14	.11		P	96	18	.23
	M	120	20	−.14		Q	102	15	.05
3. Aircraft Assembly						K	104	15	.17
Occupations,						F	103	20	.07
Selected						M	112	16	.28*
Assembler, Aircraft	G	89	16	.40**					
Structures and									

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*Significant at the .05 level.
**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
7. Artificial-Breeding Technician II, 467.384 *N=59* Supervisory ratings	G	104	12	.40**
	V	98	14	.28*
	N	106	12	.32**
	S	101	16	.12
	P	99	17	−.01
	Q	104	13	.11
	K	102	15	.04
	F	89	18	.14
	M	100	20	.33*
8. Asparagus Sorter, 529.687 *N=136* Supervisory ratings	G	96	19	.11
	V	99	18	.06
	N	91	19	.12
	S	96	20	.14
	P	97	20	.19*
	Q	99	17	.07
	K	101	18	.23**
	F	97	21	.17*
	M	108	20	.18*
9. Assembler II, 753.887 *N=50* Supervisory ratings	G	85	11	.10
	V	91	13	−.04
	N	82	15	.15
	S	85	13	.10
	P	92	17	.26
	Q	95	13	.08
	K	99	15	.16
	F	88	18	.07
	M	98	18	.21
10. Assembler (toys and games), 731.884 Model-Airplane Assembler, 731.884 Toy-Train Assembler, 731.884 *N=140*[1] Supervisory ratings	G	85	18	.36**
	V	89	17	.30**
	N	83	19	.34**
	S	89	19	.37**
	P	91	23	.31**
	Q	96	17	.22**
	K	102	17	.41**
	F	112	20	.65**
	M	113	21	.64**
11. Assembler, Accessories, 729.887 *N=55* Supervisory ratings	G	89	13	.28*
	V	90	12	.10
	N	92	16	.20
	S	94	16	.34*
	P	109	16	.16
11.—*Continued*				
	Q	111	14	.09
	K	115	19	.15
	F	102	19	.36**
	M	116	20	.24
12. Assembler, Automobile, 806.887 *N=72* Supervisory ratings	G	91	14	.09
	V	90	15	−.06
	N	87	15	.04
	S	96	17	.19
	P	94	17	.31**
	Q	94	13	.23
	K	92	18	.11
	F	98	17	.29*
	M	96	15	.31**
13. Assembler, Components, 723.884 *N=55* Supervisory ratings	G	96	14	.12
	V	96	13	−.01
	N	97	14	.25
	S	95	18	.08
	P	101	13	.27*
	Q	96	14	.05
	K	101	17	−.13
	F	109	16	.24
	M	110	15	.52**
14. Assembler, Dry Cell and Battery, 727.887 *N=94* Supervisory ratings	G	91	13	.11
	V	90	12	.20
	N	91	16	.09
	S	94	16	.11
	P	98	18	.27**
	Q	98	16	.16
	K	96	16	.45**
	F	101	19	.48**
	M	100	18	.50**
15. Assembler, Hearing Aid and Detector, 712.884 *N=51* Supervisory ratings	G	92	18	.22
	V	96	17	.11
	N	92	19	.17
	S	93	18	.14
	P	104	13	.00
	Q	108	17	−.11
	K	112	11	.03
	F	116	14	.12
	M	112	12	.55**

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*Significant at the .05 level.

**Significant at the .01 level.

[1] N=86 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
16. Assembler, Medical	G	79	17	.23
and Surgical Sup-	V	86	14	.29*
plies, 719.885	N	75	20	.23
Medical and Surgical	S	90	17	.25
Supplies Assembler,	P	95	20	.33*
719.885	Q	96	15	.33*
Validation sample	K	105	18	.24
N=53	F	111	19	.18
Supervisory ratings	M	120	18	.46**
Cross Validation	G	89	16	.43**
sample	V	95	15	.29*
N=60	N	86	18	.35**
Supervisory ratings	S	95	16	.34**
	P	104	19	.17
	Q	110	13	.17
	K	104	15	.13
	F	102	16	.32*
	M	119	17	.37**
Combined sample	G	84	17	....
N=113	V	91	15	....
	N	81	19	....
	S	93	16	....
	P	100	20	....
	Q	103	16	....
	K	104	17	....
	F	106	18	....
	M	120	17	....
17. Assembler, Micro-	G	93	14	.11
wave Tube, 692.885	V	96	12	−.05
N=60	N	90	16	.23
Supervisory ratings	S	98	17	.12
	P	108	19	.21
	Q	110	14	.30*
	K	112	16	.29*
	F	104	18	.36**
	M	113	21	.26*
18. Assembler, Radio-	G	82	12	.16
sonde, 722.884	V	86	11	.19
N=57	N	82	16	.03
Supervisory ratings	S	85	15	.18
	P	94	15	.08
18.—*Continued*				
	Q	96	16	.27*
	K	99	16	.10
	F	94	17	.25
	M	99	19	.28*
19. Audit Clerk, 210.388	G	109	14	.39**
N=53	V	111	15	.31*
Supervisory ratings	N	110	14	.50**
	S	101	16	.26
	P	100	21	.49**
	Q	120	18	.42**
	K	112	21	.43**
	F	101	21	.32*
	M	95	20	.29*
20. Autoclave	G	95	17	.13
Operator, 553.782	V	91	15	.08
N=52	N	95	16	.04
Supervisory ratings	S	97	19	.23
	P	92	15	.15
	Q	93	13	.16
	K	91	17	.13
	F	92	18	.14
	M	93	17	−.02
21. Automobile-Body	G	96	15	.09
Repairman,	V	93	15	−.03
807.381	N	90	15	.10
Validation sample	S	110	17	.13
N=56	P	97	16	.35**
Instructors' ratings	Q	96	16	.27*
	K	89	20	.19
	F	105	20	.17
	M	104	20	.29*
Cross Validation	G	91	14	.16
sample	V	92	13	.07
N=63	N	89	16	.04
Instructors' ratings	S	100	18	.33**
	P	97	22	.32**
	Q	98	16	.07
	K	97	21	.02
	F	92	21	.26*
	M	104	22	.23

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
21.—*Continued*				
Combined sample	G	94	15	....
N=119	V	92	14	....
	N	90	16	....
	S	105	18	....
	P	97	19	....
	Q	97	16	....
	K	93	21	....
	F	98	22	....
	M	104	21	....
22. Automobile Mechanic,	G	97	17	.26**
620.281	V	93	14	.21**
Foreign Car	N	91	18	.25**
Mechanic, 620.281	S	111	18	.10
N=247	P	104	19	.17**
Supervisory ratings	Q	104	14	.24**
	K	98	18	.15*
	F	99	17	.09
	M	112	21	.14*
23. Automobile-	G	96	17	.09
Service-Station	V	93	18	−.02
Attendant, 915.867	N	97	18	.10
N=52	S	98	18	.08
Supervisory ratings	P	93	15	−.03
	Q	97	13	.18
	K	96	14	.24
	F	97	19	.09
	M	115	21	.18
24. Automobile-Service	G	90	11	.39**
Station Mechanic,	V	89	11	.32*
620.381	N	86	14	.20
Validation sample	S	97	14	.39**
N=54	P	92	14	.34*
Course grades	Q	95	11	.33*
	K	92	17	.12
	F	86	16	.40**
	M	97	19	.20
Cross Validation	G	85	18	.40**
N=42 sample	V	86	14	.40**
Supervisory ratings	N	81	22	.21
	S	99	19	.43**
24.—*Continued*				
	P	91	25	.46**
	Q	91	16	.22
	K	89	20	.02
	F	92	24	.34*
	M	100	22	.34*
Combined sample	G	88	15	....
N=96	V	87	13	....
	N	84	18	....
	S	98	16	....
	P	92	20	....
	Q	93	14	....
	K	90	19	....
	F	88	20	....
	M	98	20	....
25. Bag-Machine	G	89	14	.60**
Operator, 649.885	V	86	13	.35**
Waxed-Bag-Machine	N	89	17	.40**
Operator, 649.885	S	94	19	.58**
N=55	P	90	19	.40**
Supervisory ratings	Q	87	15	.24
	K	88	18	.13
	F	88	18	.13
	M	97	21	.26
26. Bagger, 920.887	G	79	15	.10
Bag Sealer, 920.887	V	87	15	.02
Weigher II, 224.487	N	73	17	−.02
N=50	S	81	17	.27
Supervisory ratings	P	78	19	.24
	Q	82	13	.10
	K	98	16	.32*
	F	92	16	.32*
	M	92	15	.38**
27. Baker, 526.781	G	89	12	.35**
N=65	V	89	11	.16
School grades	N	87	14	.22
	S	95	16	.43**
	P	93	14	.38**
	Q	92	10	.36**

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
27.—*Continued*					30.—*Continued*				
	K	93	15	.16	*Cross Validation*	G	90	16	.43**
	F	90	19	.28*	*sample II*	V	89	14	.39**
	M	99	20	.13	*N=61*	N	88	16	.36**
28. Bakery-Wagon	G	102	15	.14	Instructors' ratings	S	93	19	.45**
Driver, 292.358	V	96	14	.13	and course grades	P	93	20	.54**
N=52	N	108	15	.10	(correlations shown	Q	90	15	.54**
Supervisory ratings	S	100	21	.15	are for instructors'	K	92	19	.33**
	P	103	18	−.02	ratings)	F	92	18	.42**
	Q	103	14	.03		M	98	22	.46**
	K	114	15	.18	*Combined sample*	G	96	16	....
	F	103	20	.08	*N=207*	V	92	13	....
	M	117	17	.05		N	93	19	....
29. Balling-Machine	G	78	13	.02		S	102	19	....
Operator II,	V	85	10	.11		P	98	20	....
689.885	N	76	16	.19		Q	98	15	....
N=66	S	85	14	−.23		K	100	19	....
Supervisory ratings	P	93	15	.11		F	96	21	....
	Q	93	10	.18		M	109	24	....
	K	96	17	.25*	31. Baser, 692.885	G	89	14	.31
	F	94	18	.03	Threader, 725.887	V	88	13	.28
	M	108	17	.16	*N=62*[2]	N	91	17	.22
30. Barber, 330.371	G	101	14	.28**	Production records	S	94	18	.21
Validation sample	V	94	13	.22*		P	98	20	.29
N=95	N	99	21	.49**		Q	91	15	.27
Supervisory ratings	S	107	18	.30**		K	93	16	.45**
	P	106	19	.14		F	100	18	.53**
	Q	103	13	.14		M	97	17	.50**
	K	106	18	.20*	32. Battery Loader,	G	75	14	.20
	F	102	20	.32**	683.886	V	79	12	.25
	M	120	20	.25*	*N=48*	N	69	18	.21
Cross Validation	G	95	15	.50**	Supervisory ratings	S	78	15	.12
sample I	V	93	13	.46**		P	76	20	.13
N=51	N	90	17	.41**		Q	79	11	.20
Instructors' ratings	S	104	18	.52**		K	84	17	.21
	P	97	20	.28*		F	91	16	.07
	Q	99	15	.50**		M	100	18	.21
	K	97	18	.16					
	F	90	21	.45**					
	M	102	24	.28*					

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*Significant at the .05 level.

**Significant at the .01 level.

[2] N=34 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
33. Bench Carpenter, 760.884 *N=48* Instructors' ratings	G	93	18	.45**	37.—*Continued*				
	V	90	14	.27		Q	106	14	.28*
	N	89	18	.48**		K	97	16	.17
	S	101	22	.39**		F	100	17	.14
	P	94	23	.39**		M	102	18	.06
	Q	95	12	.42**	38. Boarding-Machine Operator, 589.885 *N=103* [3] Production records	G	84	13	−.16
	K	89	26	.16		V	85	12	−.14
	F	93	23	.34		N	83	16	−.04
	M	99	26	.15		S	90	17	−.14
34. Billet Yard Jobs Picker, 503.885 Scarfer, 816.884 Chipper I, 705.884 *N=80* Supervisory ratings	G	107	11	.41*		P	91	17	−.07
	V	98	12	.26		Q	88	15	.07
	N	109	12	.39*		K	92	18	.08
	S	109	16	.34*		F	91	17	.10
	P	112	13	.62*		M	105	17	.32*
	Q	107	11	.44*	39. Boat Loader, 726.884 *N=63* Supervisory ratings	G	100	11	.34**
	K	111	14	.34*		V	100	12	.24
	F	99	17	.25		N	103	14	.35**
	M	119	20	.37*		S	99	14	.15
35. Bindery Worker, 643.885 *N=103* Supervisory ratings	G	90	16	.20		P	110	12	.29*
	V	91	14	.14		Q	118	14	.27*
	N	90	16	.14		K	114	14	.26*
	S	96	17	.22*		F	104	16	.27*
	P	98	19	.16		M	103	17	.18
	Q	102	15	.00	40. Body Maker Feeder and Side Seam Tender, 616.884 *N=49* Supervisory ratings	G	92	15	.09
	K	105	14	.05		V	92	13	−.04
	F	100	19	.41**		N	90	19	.19
	M	107	20	.14		S	100	17	.00
36. Biologist, 041.081 *N=50* School grades	G	125	11	.49**		P	100	21	−.05
	V	120	12	.37**		Q	104	14	.04
	N	121	11	.37**		K	98	18	.12
	S	121	16	.37**		F	90	20	.34*
	P	117	16	−.07		M	103	21	.22
	Q	123	14	.09	41. Boilermaker I, 805.281 *N=81* Supervisory ratings	G	96	14	.26*
	K	125	19	−.05		V	93	12	.24*
	F	101	15	−.16		N	92	14	.21
	M	112	22	−.01		S	99	18	.18
37. Blown Plastic Container Machine Operator, 556.815 *N=58* Supervisory ratings	G	95	16	.27*		P	88	17	.14
	V	92	14	.24		Q	87	13	.27*
	N	94	16	.23		K	88	18	.18
	S	105	19	.15		F	86	20	.21
	P	107	14	.04		M	86	21	.17

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*Significant at the .05 level.

**Significant at the .01 level.

[3] N=52 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
42. Bomb-Fuse-Parts Assembler, 737.884 *N=90* Supervisory ratings	G	95	12	.21*
	V	93	10	.34**
	N	96	15	.25*
	S	98	15	.12
	P	106	13	.33**
	Q	101	13	.23*
	K	99	18	.13
	F	98	19	.37**
	M	99	16	.31**
43. Book-and-Game Line Attendant, 920.887 *N=59* Supervisory ratings	G	99	15	.29*
	V	98	15	.18
	N	101	15	.48**
	S	99	19	.14
	P	108	14	.36**
	Q	113	15	.32*
	K	105	14	.05
	F	101	21	.03
	M	105	18	.07
44. Bookkeeper I, 210.388 *N=66* Instructors' ratings	G	110	16	.52**
	V	106	16	.51**
	N	112	15	.37**
	S	103	20	.38**
	P	104	18	.40**
	Q	111	18	.40**
	K	103	21	.38**
	F	100	22	.36**
	M	105	21	.36**
45. Bookkeeping-Machine Operator I, 215.388 *N=102*[4] Production records and supervisory ratings	G	105	12	.17
	V	109	13	.07
	N	109	13	.31*
	S	102	16	.03
	P	118	16	.36**
	Q	121	15	.29*
	K	114	17	.13
	F	110	18	.24
	M	96	19	.12
46. Braiding-Machine Operator, 689.885 *N=51* Supervisory ratings	G	77	16	.25
	V	80	13	.24
	N	74	20	.28*
	S	81	17	.11
	P	75	22	.22
46.—*Continued*	Q	86	16	.27
	K	82	20	.49**
	F	91	22	.39**
	M	101	22	.37**
47. Bricklayer, 861.381 *N=50* School grades	G	107	11	.38**
	V	94	10	.51**
	N	107	14	.31*
	S	114	14	.06
	P	114	12	.26
	Q	97	12	.38**
	K	102	14	.16
	F	99	21	.15
	M	96	23	.22
48. Cabinetmaker, 660.280 *Validation sample* *N=81* Instructors' rating	G	102	12	.42**
	V	94	12	.06
	N	100	14	.40**
	S	115	17	.42**
	P	106	14	.38**
	Q	99	11	.39**
	K	96	16	.16
	F	103	18	.08
	M	113	19	.05
Cross Validation sample *N=31* Supervisory ratings	G	104	15	.33
	V	98	16	.23
	N	99	14	.23
	S	107	19	.46**
	P	95	22	.22
	Q	93	13	.24
	K	94	16	−.02
	F	92	25	.00
	M	92	24	.09
Combined sample *N=112*	G	103	13	....
	V	95	13	....
	N	100	14	....
	S	113	18	....
	P	103	18	....
	Q	98	12	....
	K	95	16	....
	F	100	21	....
	M	108	22	....

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*Significant at the .05 level.

**Significant at the .01 level.

[4] N=60 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
49. Cable Assembler,	G	83	16	.48**
709.884	V	89	12	.56**
N=53	N	84	20	.39**
Supervisory ratings	S	87	18	.22
	P	100	20	.22
	Q	106	14	.38**
	K	100	21	.39**
	F	109	19	.35*
	M	106	23	.27
50. Cable Maker,	G	102	14	.29*
726.884	V	96	13	.18
Validation sample	N	101	16	.34**
N=70	S	104	16	.16
Supervisory ratings	P	100	18	.30*
	Q	100	14	.39**
	K	101	18	.40**
	F	97	17	.24*
	M	106	16	.02
Cross Validation	G	98	17	.58**
sample	V	97	16	.36**
N=30	N	100	16	.61**
Supervisory readings	S	100	17	.45*
	P	112	18	.29
	Q	110	14	.54**
	K	112	18	.42*
	F	113	18	.07
	M	120	19	.22
Combined sample	G	100	15	....
N=100	V	97	14	....
	N	101	16	....
	S	103	16	....
	P	103	19	....
	Q	103	15	....
	K	104	18	....
	F	102	19	....
	M	110	19	....
51. Calculating-	G	111	14	−.06
Machine Operator,	V	109	14	−.15
216.488	N	112	12	.05
N=53	S	103	19	−.19
Supervisory ratings	P	112	19	.10
51.—*Continued*				
	Q	121	13	.21
	K	117	16	.43**
	F	112	19	.21
	M	102	20	.24
52. Candy Packer,	G	80	14	.26*
920.887	V	86	12	.35**
N=75	N	78	15	.00
Supervisory ratings	S	79	15	.28*
	P	82	15	.19
	Q	90	13	.16
	K	100	17	.17
	F	97	17	.31**
	M	97	17	.26*
53. Candy-Wrapping-	G	85	13	.28*
Machine Operator,	V	90	13	.34**
920.885	N	86	17	.24*
N=63	S	83	14	.37**
Supervisory ratings	P	91	18	.35**
	Q	99	17	.28*
	K	100	19	.28*
	F	102	16	.28*
	M	105	15	.15
54. Cannery Worker	G	87	17	.18
(Machine	V	88	14	.16
Operators), 529.886	N	85	20	.16
N=194[5]	S	90	19	.19
Supervisory ratings	P	90	22	.19
	Q	94	16	.05
	K	96	17	.22*
	F	96	18	.12
	M	97	20	.31**
55. Cannery Worker	G	86	17	.18*
(Trimmers	V	88	16	.19*
and Sorters)	N	85	20	.22*
529.886	S	87	17	.18*
Validation sample	P	87	21	.18*
N=377[6]	Q	93	15	.22**
Supervisory ratings	K	97	18	.50**
	F	94	22	.29**
	M	100	23	.45**

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*Significant at the .05 level.

**Significant at the .01 level.

[5] N=83 for r's.

[6] N=141 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
55.—*Continued*				
Cross Validation	G	102	18	−.05
sample	V	94	20	−.14
$N=33$	N	92	18	.02
Supervisory ratings	S	93	19	.01
	P	93	18	.07
	Q	95	17	−.19
	K	97	15	.02
	F	95	19	−.06
	M	106	20	−.13
Combined sample	G	88	17	....
$N=410$	V	89	16	....
	N	86	19	....
	S	88	18	....
	P	88	21	....
	Q	93	16	....
	K	97	17	....
	F	94	22	....
	M	101	22	....
56. Capacitor Winder,	G	92	14	.36**
726.884	V	95	14	.30*
$N=53$	N	89	14	.37**
Supervisory ratings	S	93	17	.15
	P	96	18	.13
	Q	106	13	.39**
	K	99	15	.15
	F	98	16	−.10
	M	102	20	.04
57. Carder, 712.887	G	94	16	.30
Assembler, 712.887	V	94	14	.15
$N=58$	N	99	18	.43#
Supervisory ratings	S	93	18	.34#
	P	109	22	.64#
	Q	111	14	.61#
	K	108	15	.48#
	F	99	18	.33#
	M	107	16	.40#
58. Carding-Machine	G	91	14	.24
Operator, 681.885	V	92	15	.13
$N=51$	N	94	16	.29*
Supervisory ratings	S	90	17	.11
58.—*Continued*				
	P	98	19	.20
	Q	101	13	.16
	K	102	13	.27
	F	103	18	.14
	M	99	17	.35*
59. Card Tender,	G	80	15	.18
680.885	V	80	11	.16
$N=53$	N	76	20	.20
Supervisory ratings	S	89	18	.11
	P	85	22	.06
	Q	89	17	.14
	K	81	18	.28*
	F	80	22	−.06
	M	92	21	.04
60. Carpenter, 860.381	G	99	15	.39**
$N=119$[7]	V	91	15	.22
School grades and	N	96	17	.49**
Supervisory ratings	S	109	18	.15
	P	99	12	.23*
	Q	88	15	.28**
	K	95	16	.42**
	F	102	17	.31**
	M	103	16	.23*
61. Carpet Layer,	G	107	15	.20
299.381	V	103	16	.12
Floor Layer,	N	100	15	.35**
864.781	S	111	18	−.02
$N=101$[8]	P	98	16	.15
Supervisory ratings	Q	99	12	.24
	K	102	18	.40**
	F	93	23	.20
	M	104	24	.34*
62. Carton-Forming-	G	97	18	.52**
Machine Operator,	V	92	15	.39**
641.885	N	94	19	.47**
$N=53$	S	103	22	.45**
Supervisory ratings				

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*Significant at the .05 level.

**Significant at the .01 level.

Correlation more than twice the standard error.

[7] N=73 for r's.

[8] N=54 for r's.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
62.—*Continued*				
	P	92	20	.53**
	Q	94	13	.33*
	K	88	18	.36**
	F	89	17	.38**
	M	87	21	.50**
63. Case Coverer,	G	94	14	.16
739.884	V	95	14	.13
Case Liner,	N	97	15	.12
739.884	S	96	14	.30*
N=50	P	104	15	.18
Supervisory ratings	Q	103	14	.12
	K	105	15	.27
	F	103	19	.62**
	M	110	18	.50**
64. Case Worker,	G	116	13	.15
195.108	V	120	13	.11
N=106	N	112	12	.22*
Supervisory ratings	S	105	18	−.01
	P	102	16	.15
	Q	119	15	.13
	K	115	15	.09
	F	99	20	.14
	M	98	21	.19
65. Cementer, Hand,	G	88	13	.22
788.887	V	96	14	.07
N=54	N	86	15	.20
Supervisory ratings	S	85	12	.23
	P	87	15	.08
	Q	94	15	.14
	K	100	17	.17
	F	99	20	.27*
	M	103	19	.22
66. Cementer, Life	G	92	16	.38**
Rafts, 751.887	V	94	16	.36**
N=56	N	87	19	.29*
Supervisory ratings	S	94	16	.47**
	P	97	20	.46**
	Q	95	16	.34**
	K	99	19	.33*
66.—*Continued*				
	F	102	19	.31*
	M	95	20	.14
67. Cement Mason,	G	84	17	.41**
844.884	V	83	16	.30*
N=52	N	79	19	.39**
Supervisory ratings	S	90	18	.32*
	P	82	22	.40**
	Q	84	14	.25
	K	91	18	.39**
	F	84	23	.34*
	M	101	20	.45**
68. Central-Office	G	97	13	.56**
Operator, 235.862	V	100	13	.47**
N=88 [a]	N	95	14	.53**
Supervisory ratings	S	97	17	.30*
	P	109	15	.32**
	Q	107	15	.33**
	K	106	18	.35**
	F	104	20	.26*
	M	111	21	.25*
69. Central-Office	G	113	16	.37**
Repairman, 822.281	V	106	14	.28*
N=64	N	110	15	.30*
Supervisory ratings	S	116	18	.37**
	P	110	15	.24
	Q	109	14	.35**
	K	107	15	.15
	F	106	16	.24
	M	112	23	.32*
70. Cereal Packer,	G	91	15	−.01
920.887	V	92	13	−.02
N=54	N	89	16	.00
Supervisory ratings	S	91	18	.02
	P	99	18	−.04
	Q	100	15	.05
	K	102	12	.22
	F	105	16	.04
	M	110	14	.29*

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*Significant at the .05 level.

**Significant at the .01 level.

[a] N=64 for r's.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
71. Charwoman, 381.887	G	76	13	.12
Maid, Hospital,	V	82	9	.11
323.887	N	75	16	.21
Porter I, 381.887	S	80	16	.00
N=88	P	69	19	.06
Supervisory ratings	Q	81	14	.01
	K	84	18	.09
	F	71	18	.22
	M	85	21	.28*
72. Cheese Wrapper	G	91	14	.12
and Packer,	V	91	13	.16
920.887	N	94	17	.13
N=61	S	98	18	.23
Supervisory ratings	P	108	17	.31*
	Q	101	15	.28*
	K	102	16	.37**
	F	109	18	.03
	M	113	20	.23
73. Chemical and Metal-	G	117	13	.37**
lurgical Technol-	V	108	14	.37**
ogy-Technical	N	115	12	.27*
Institute Training,	S	120	15	.21
008. and 011.	P	113	14	.06
N=55	Q	110	11	.04
Grade-point averages	K	109	15	.07
	F	108	17	−.15
	M	117	23	−.10
74. Chemical Operator	G	105	13	.20
III, 559.782	V	103	13	−.18
N=50	N	101	15	.27
Supervisory ratings	S	105	17	.29*
	P	95	13	.06
	Q	98	12	.08
	K	104	14	−.19
	F	94	17	.13
	M	106	20	−.07
75. Circular Knitter,	G	91	15	.40**
685.885	V	91	13	.32*
N=53	N	88	17	.22
Supervisory ratings	S	97	19	.34*
	P	94	19	.24
	Q	98	15	.25
75.—Continued				
	K	103	15	.21
	F	96	19	.25
	M	96	20	−.05
76. Claim Adjuster,	G	116	12	.20*
241.168	V	109	12	.20*
N=106	N	116	12	.32**
Supervisory ratings	S	114	15	−.05
	P	108	16	.06
	Q	111	12	.26**
	K	107	16	.31**
	F	97	17	.14
	M	107	19	.17
77. Classifier, 361.687	G	82	17	.09
N=52	V	88	17	.09
Supervisory ratings	N	78	19	.10
	S	84	15	.00
	P	81	18	.12
	Q	89	14	.17
	K	93	18	.20
	F	86	18	.14
	M	94	18	.14
78. Clerical Occupations,	G	109	14	−.08
Selected	V	109	15	−.14
Checker II, 209.688	N	110	16	.00
IBM Coder, 219.388	S	103	16	.04
Inserter, 230.887	P	109	17	.02
Letter-Opener Oper-	Q	113	14	−.01
ator, 231.588	K	109	15	.29
Mail Clerk, 231.588	F	104	17	.17
Sorter, 209.688	M	108	19	.18
N=66				
Supervisory ratings				
79. Clerk, General	G	108	14	.26**
Office, 219.388	V	108	15	.22**
Validation sample	N	111	14	.23**
N=198	S	101	18	.07
Supervisory ratings	P	114	17	.06
	Q	123	15	.15*
	K	117	15	.04
	F	....	....	....
	M	....	....	....

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*Significant at the .05 level.
**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
79.—*Continued*					82.—*Continued*				
Cross Validation	G	102	14	.33**	Air-Conditioning-				
Sample	V	104	15	.32**	Unit Installer,	S	91	17	.29*
N=103	N	105	14	.25*	827.884	P	91	14	.22
Supervisory ratings	S	99	18	.19*	*N=61*	Q	92	14	.03
	P	108	16	.07	Supervisory ratings	K	92	13	.26*
	Q	118	14	.27**		F	90	12	.18
	K	115	16	.20*		M	92	16	.08
	F	105	17	.10	83. Coil Finisher,	G	96	15	.24
	M	104	20	−.04	724.887	V	98	15	.15
Combined sample	G	106	14	....	*N=53*	N	97	15	.13
N=301	V	107	15	....	Supervisory ratings	S	94	16	.36**
	N	109	14	....		P	101	15	.31*
	S	100	18	....		Q	102	15	.27*
	P	112	17	....		K	100	16	.07
	Q	122	15	....		F	99	18	.39**
	K	116	16	....		M	101	19	.22
	F	....	....	....	84. Coil Winder II,	G	97	14	.34*
	M	....	....	....	724.884	V	98	14	.28*
80. Clothes Designer,	G	110	12	.37**	*N=65*	N	97	14	.25*
142.081	V	112	13	.33**	Supervisory ratings	S	95	17	.40**
N=149 [10]	N	101	13	.29**		P	99	17	.33**
School grades	S	116	14	.21*		Q	105	15	.25*
	P	114	15	.31**		K	102	19	.35**
	Q	111	13	.14		F	102	19	.38**
	K	114	17	.20*		M	107	21	.32**
	F	114	16	.08	85. Coin-Vending-	G	98	15	.06
	M	105	19	.08	Machine Collector,	V	96	13	.21
81. Coding Clerk,	G	100	18	.22	292.483	N	100	17	.12
219.388	V	107	16	.24	*N=57*	S	100	17	−.16
N=64	N	95	20	.19	Supervisory ratings	P	104	17	.20
Supervisory ratings	S	99	18	.06		Q	102	15	.11
	P	100	18	.21		K	104	15	.09
	Q	111	15	.11		F	102	21	.00
	K	109	15	.07		M	105	20	.00
	F	96	23	−.07	86. Composition	G	89	15	.16
	M	92	24	−.15	Roofer, 866.381	V	86	13	.23
82. Coil Assembler,	G	92	11	.35**	*N=50*	N	85	17	.08
706.884	V	88	10	.04	Supervisory ratings	S	98	19	.17
	N	94	14	.30*	and Instructors'	P	90	20	.33*
					ratings	Q	91	13	.24

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*Significant at the .05 level.

**Significant at the .01 level.

[10] N=102 for r's.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
86.—*Continued*				
(Correlations shown	K	94	18	.34*
are for supervisory	F	98	18	.38**
ratings)	M	100	19	.61**
87. Compositor I,	G	106	16	.35**
973.381	V	106	15	.33**
N=107	N	101	14	.38**
Supervisory ratings	S	105	19	.17
	P	99	15	.17
	Q	105	14	.32**
	K	103	14	.26**
	F	103	18	.13
	M	111	19	.27**
88. Compression-Molding-Machine	G	103	17	.40**
Tender, 556.885	V	98	16	.38**
	N	101	18	.44**
Validation sample	S	106	22	.22
N=56	P	102	19	.53**
Supervisory ratings	Q	101	17	.38**
	K	96	18	.53**
	F	100	20	.31*
	M	110	21	.36**
Cross Validation	G	100	13	.05
sample	V	96	15	.11
N=35	N	99	17	.17
Supervisory ratings	S	99	15	−.23
	P	99	13	.43**
	Q	101	12	.38*
	K	102	14	.58**
	F	95	19	.36*
	M	113	20	.47**
Combined sample	G	102	16	....
N=91	V	97	16	....
	N	100	17	....
	S	104	20	....
	P	101	17	....
	Q	101	15	....
	K	98	17	....
	F	98	20	....
	M	111	20	....
89. Computer Technology	G	117	13	.40**
Trainee, 828.XX	V	107	12	.32**
Validation sample	N	113	13	.34**
N=272[11]	S	121	15	.25**
Course grades	P	119	16	.09
	Q	116	13	.17
	K	104	15	.08
	F[12]	99	19	−.03
	M[12]	106	21	−.01
Cross Validation	G	118	13	.45**
sample	V	108	12	.44**
N=241[13]	N	115	13	.31**
	S	122	15	.27**
	P	119	17	.09
	Q	117	13	.22**
	K	102	16	.01
	F	104	18	.10
	M	111	20	.14
Combined sample	G	117	13	....
N=513	V	108	12	....
	N	114	13	....
	S	122	15	....
	P	119	16	....
	Q	116	13	....
	K	103	15	....
	F[14]	101	19	....
	M[14]	108	21	....
90. Construction-	G	93	13	.11
Equipment	V	92	14	.11
Mechanic, 620.281	N	88	13	.08
N=50	S	97	16	.09
Supervisory ratings	P	90	17	.15
	Q	91	13	.08
	K	84	20	−.08
	F	94	21	.04
	M	91	24	.04
91. Container-Maker-	G	88	13	.02
Filler-Packer Operator, 920.885	V	93	14	.08
	N	88	14	−.02
N=53	S	85	15	−.08
Supervisory ratings				

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*Significant at the .05 level.

**Significant at the .01 level.

[11] Total usable sample.

[12] N=271.

[13] Total usable sample.

[14] N=512.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
91.—*Continued*					95.—*Continued*				
	P	89	16	.09		K	116	18	.20
	Q	93	14	.21		F	100	19	.17
	K	97	15	.32*		M	97	19	.16
	F	97	19	.13	96. Core-Plane Wirer,	G	93	15	.28*
	M	103	20	.08	726.884	V	99	13	.28*
92. Conveyor-Loader,	G	85	19	.03	*N=58* [16]	N	90	16	.24
Plastic Toy Parts,	V	87	16	.00	Supervisory ratings	S	95	15	.10
920.887	N	83	22	−.07		P	107	19	.12
N=48	S	89	18	−.09		Q	103	13	.26*
Supervisory ratings	P	87	25	.01		K	108	14	−.14
	Q	90	17	−.25		F	107	18	.16
	K	95	18	.19		M	95	15	.07
	F	95	22	.10	97 Correction	G	110	12	.21
	M	110	20	.22	Officer, 372.868	V	110	12	.28*
93. Cook, 313.381	G	101	14	.22**	*N=51*	N	110	12	.25
N=160	V	96	13	.12	Supervisory ratings	S	105	17	−.15
Course grades	N	99	15	.12		P	106	13	.19
	S	106	17	.25**		Q	113	12	.38**
	P	102	17	.20*		K	102	17	.23
	Q	99	13	.10		F	94	18	.10
	K	101	18	.12		M	106	20	.15
	F	95	20	.04	98. Corrugator Operator,	G	86	15	.04
	M	105	20	.04	643.782	V	86	11	.03
94. Cook, Short Order,	G	78	13	.35*	*N=70*	N	86	17	.05
314.381	V	82	10	.11	Supervisory ratings	S	92	17	.04
N=46	N	74	15	.41**		P	88	21	−.04
Instructors' ratings	S	86	16	.36*		Q	94	15	.11
	P	89	18	.46**		K	94	16	.10
	Q	90	14	.33*		F	91	21	.07
	K	85	18	.29*		M	94	20	.12
	F	83	23	.44**	99. Cosmetologist,	G	95	14	.33**
	M	86	20	.50**	332.271	V	96	15	.24*
95. Copy Holder,	G	108	16	.34*	*N=99*	N	92	13	.31**
209.588	V	112	16	.29*	Instructors' ratings	S	100	16	.25*
Proofreader I,	N	107	18	.41**	and school grades	P	106	16	.24*
209.688	S	100	17	.18		Q	106	14	.16
N=105 [15]	P	108	20	.26		K	102	17	−.02
Work sample scores	Q	122	20	.49**		F	96	18	.08
and supervisory						M	98	17	.07
ratings									

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*Significant at the .05 level.
**Significant at the .01 level.
[15] N=57 for r's.
[16] N=50 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
100. Cottage Parent,	G	78	20	.33*	102.—*Continued*				
355.878	V	88	15	.22		Q	118	16	....
N=56	N	76	22	.29*		K	114	15	....
Supervisory ratings	S	84	17	.36**		F	105	18	....
	P	89	24	.20		M	107	21	....
	Q	99	17	.24	103. Countergirl, 311.878	G	86	13	.20
	K	106	18	.24	Counterman,	V	87	13	.34*
	F	92	19	−.02	Lunchroom or	N	85	17	.18
	M	99	19	.31*	Coffee Shop,	S	90	14	−.10
101. Counselor II,	G	113	11	.23	311.878	P	94	15	.32*
045.108	V	113	11	.10	*N=50*	Q	92	13	.40**
N=53	N	112	10	.23	Supervisory ratings	K	95	18	.49**
Supervisory ratings	S	105	18	−.02		F	100	18	.13
	P	108	20	−.03		M	95	22	.31*
	Q	117	14	.01	104. Counterman, Automotive Parts,	G	111	11	.09
	K	111	17	−.03		V	109	14	.11
	F	94	21	.23	289.358	N	108	10	.20
	M	107	25	.09	*N=53*	S	107	18	−.03
102. Counselor, Camp,	G	112	15	.30*	Supervisory ratings	P	100	14	−.01
159.228	V	111	13	.21		Q	102	14	.20
Validation sample	N	107	16	.24		K	100	16	.21
N=65	S	111	17	.17		F	94	21	−.19
Supervisory ratings	P	114	16	.20		M	91	21	.19
	Q	114	14	.27*	105. Credit Man,	G	118	15	.19
	K	112	14	.11	168.268	V	117	16	.20
	F	104	17	.04	*N=59*	N	114	16	.22
	M	112	20	.24	Supervisory ratings	S	113	18	−.03
Cross Validation	G	117	16	.26		P	109	18	.02
sample	V	121	14	.17		Q	121	14	.14
N=90	N	113	15	.20		K	117	19	.26*
(Computations in this	S	110	22	.24		F	93	18	−.08
table based on N=	P	121	16	.10		M	108	17	.24
56 [females]	Q	122	13	.05	106. Custodian, School,	G	88	16	.17
Supervisory ratings	K	116	17	.24	381.887	V	88	14	.07
	F	110	18	−.05	*N=87*	N	84	18	.19
	M	104	23	.01	Supervisory ratings	S	94	18	.15
Combined sample	G	117	15	....		P	81	19	.12
N=155	V	118	15	....		Q	88	13	.17
[Computations in this	N	112	16	....		K	85	20	.15
table based on	S	111	20	....		F	83	19	.11
N=121]	P	116	16	....		M	92	20	.12

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
107. Cutting-and-	G	94	17	.33**
Creasing Press-	V	95	15	.27*
man, 649.782	N	91	19	.32**
$N=77$	S	100	17	.28*
Supervisory ratings	P	91	18	.36**
	Q	94	15	.24*
	K	94	19	.27*
	F	91	17	.20
	M	87	22	.23*
108. Decorator, Hand,	G	96	13	.14
740.884	V	94	14	.16
$N=70$	N	94	15	−.01
Supervisory ratings	S	102	14	.25*
	P	112	15	.15
	Q	103	15	.08
	K	104	19	.17
	F	94	17	−.04
	M	95	20	−.07
109. Dental Assistant,	G	100	11	.39**
079.378	V	100	12	.18
Validation sample	N	97	12	.38**
$N=53$	S	102	14	.30*
Instructors' ratings	P	110	19	.30*
	Q	112	14	.19
	K	116	16	.47**
	F	105	17	.50**
	M	108	21	.60**
Cross Validation	G	100	14	.36**
sample I	V	104	13	.35**
$N=85$	N	98	14	.30**
Instructors' ratings	S	104	17	.30**
	P	115	16	.26*
	Q	119	14	.36**
	K	112	14	.25*
	F	112	17	.14
	M	118	16	.12
Cross Validation	G	109	12	.57**
sample II	V	107	12	.32**
$N=121$	N	107	13	.40**
Supervisory ratings	S	110	14	.51**
	P	120	16	.28**
109.—*Continued*				
	Q	118	12	.22**
	K	114	14	.14
	F	115	17	.21*
	M	116	18	.12
Cross Validation	G	106	18	.57**
sample III	V	109	15	.54**
$N=31$	N	98	16	.57**
Supervisory ratings	S	107	18	.41*
	P	111	19	.52**
	Q	112	12	.57**
	K	115	20	.70**
	F	112	24	.47**
	M	108	23	.23
Cross Validation	G	110	11	.24
sample IV	V	110	11	.13
$N=52$	N	106	12	.09
Grade-point averages	S	110	16	.31*
and instructors'	P	117	13	.26
ratings	Q	120	12	−.14
(Correlations shown	K	109	12	.13
are for instructors'	F	109	16	.19
ratings)	M	118	20	.31*
Combined sample	G	105	14	....
$N=342$	V	106	13	....
	N	102	14	....
	S	107	16	....
	P	116	17	....
	Q	117	13	....
	K	113	15	....
	F	111	18	....
	M	115	19	....
110. Dental Hygienist,	G	118	10	.48**
078.368	V	116	13	.24*
$N=83$	N	113	9	.27*
School grades	S	118	15	.44**
	P	130	12	.45**
	Q	125	13	.12
	K	121	14	.07
	F	119	18	.10
	M	115	18	−.04

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
111. Dental-Laboratory	G	96	15	.28*
Technician, 712.381	V	97	14	.13
Validation sample	N	92	16	.12
N=56	S	100	17	.28*
Supervisory ratings	P	100	17	.16
	Q	99	13	−.13
	K	105	18	.20
	F	98	16	.26
	M	110	22	.35**
Cross Validation	G	91	18	.42**
sample I	V	92	14	.38**
N=54	N	86	18	.26
Supervisory ratings	S	98	20	.39**
	P	92	17	.21
	Q	93	13	.23
	K	95	14	.25
	F	94	17	.19
	M	98	20	.14
Cross Validation	G	101	16	.25
sample II	V	99	15	.10
N=54	N	94	14	.23
Supervisory ratings	S	109	17	.27*
	P	101	19	.07
	Q	97	12	.20
	K	98	18	.21
	F	102	22	.18
	M	114	24	.24
Combined sample	G	96	17	....
N=164	V	96	15	....
	N	91	16	....
	S	102	19	....
	P	98	18	....
	Q	96	13	....
	K	99	17	....
	F	98	19	....
	M	108	23	....
112. Dentist, 072 108	G	132	9	.13
Validation sample	V	121	13	.03
N=96	N	124	10	−.06
Lecture and	S	132	14	.34**
laboratory grades	P	120	13	.33**
112.—*Continued*				
(Correlations shown	Q	114	11	.05
are for laboratory	K	110	15	.06
grades)	F	107	15	.24*
	M	111	15	.14
Cross Validation	G	130	13	−.05
sample	V	120	13	−.14
N=81	N	121	13	−.14
Lecture and	S	135	19	.24*
laboratory grades	P	124	15	.16
(Correlations shown	Q	122	13	.13
are for laboratory	K	122	15	.08
course grades)	F	112	15	.30**
	M	113	15	.19
Combined sample	G	131	11	....
N=177	V	121	13	....
	N	123	12	....
	S	133	17	....
	P	122	14	....
	Q	118	13	....
	K	115	16	....
	F	109	16	....
	M	112	16	....
113. Department-Head	G	96	14	.22
Buyer, 299.138	V	96	15	.12
N=59	N	98	16	.32*
Supervisory ratings	S	95	16	.07
	P	95	18	.30*
	Q	106	13	.27*
	K	108	17	.22
	F	88	19	.12
	M	99	18	.19
114. Die-Casting-	G	85	14	.32*
Machine Operator	V	85	12	.14
II, 514.885	N	83	17	.29*
N=50	S	86	17	.40**
Supervisory ratings	P	85	16	.36*
	Q	87	10	.24
	K	89	15	.31*
	F	95	17	.34*
	M	98	15	.27

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*Significant at the .05 level.
**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
115. Die Cutter, 699.782	G	89	15	.43**
$N=86$ [17]	V	87	16	.34*
Supervisory ratings	N	91	16	.34*
	S	96	19	.28*
	P	92	19	.32*
	Q	86	16	.30*
	K	88	19	.28
	F	89	20	.31*
	M	91	18	.40**
116. Die Maker, 739.381	G	103	16	.20
$N=58$	V	98	15	.08
Supervisory ratings	N	98	15	.18
	S	114	19	.27*
	P	100	16	.07
	Q	99	13	.12
	K	100	12	.15
	F	99	16	.03
	M	103	16	.01
117. Diesel Mechanic,	G	110	12	.38**
625.281	V	100	9	.17
$N=52$	N	108	14	.37**
Grade-point averages	S	118	16	.22
	P	116	16	.05
	Q	113	16	.21
	K	102	19	.33*
	F	105	15	.12
	M	121	22	.21
118. Dietary Aid, 317.887	G	78	14	.54**
$N=49$	V	84	8	.44**
Supervisory ratings	N	81	15	.48**
	S	86	17	.48**
	P	95	18	.45**
	Q	103	14	.31*
	K	101	15	.06
	F	95	17	.26
	M	90	17	.34*
119. Dietitian, 077.168	G	121	12	.62**
$N=57$	V	120	14	.43**
Supervisory ratings	N	119	12	.54**
	S	113	16	.48**
119.—*Continued*				
	P	121	15	.39**
	Q	122	15	.40**
	K	116	18	.35**
	F	108	18	.58**
	M	105	21	.25
120. Digital-Computer	G	117	15	.55**
Operator, 213.382	V	109	13	.45**
Validation sample	N	118	16	.42**
$N=77$	S	116	18	.31**
Supervisory ratings	P	116	18	.18
	Q	120	13	.28*
	K	112	17	−.01
	F	106	22	.09
	M	113	27	.05
Cross Validation	G	117	17	.41**
sample	V	112	16	.40**
$N=67$	N	113	14	.34**
Supervisory ratings	S	118	19	.26*
	P	119	16	.15
	Q	120	13	.18
	K	117	15	.06
	F	103	18	.12
	M	115	19	.16
Combined sample	G	117	16	....
$N=144$	V	111	15	....
	N	116	15	....
	S	117	19	....
	P	118	17	....
	Q	120	13	....
	K	114	16	....
	F	105	20	....
	M	114	23	....
121. Director, Funeral,	G	116	12	.47**
187.168	V	110	11	.44**
Embalmer, 338.381	N	112	13	.54**
$N=50$	S	120	18	.16
Grade-point averages	P	114	16	.32*
	Q	114	13	.32*
	K	104	15	.05

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*Significant at the .05 level.

**Significant at the .01 level.

[17] N=50 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
121.—*Continued*				
	F	105	15	.21
	M	101	20	.20
122. Director, School	G	91	14	.37**
Lunch Program,	V	93	14	.35**
187.168	N	87	15	.34**
N=87	S	90	16	.22*
Supervisory ratings	P	82	18	.35**
	Q	91	15	.32**
	K	88	17	.29**
	F	82	20	.23*
	M	88	18	.21*
123. Dispatcher,	G	121	11	.62**
Motor Vehicle,	V	115	12	.68**
919.168	N	121	12	.47**
N=50	S	113	18	.17
Supervisory ratings	P	109	18	.29*
	Q	114	15	.50**
	K	110	19	.33*
	F	98	20	.09
	M	104	25	.16
124. Distribution	G	97	15	.37**
Clerk, 231.688	V	100	15	.48**
N=80	N	99	16	.35**
Work sample	S	92	17	.10
	P	102	17	.34**
	Q	106	15	.32**
	K	107	16	.38**
	F	100	18	.21
	M	108	19	.12
125. Doffer, 689.886	G	78	13	.22
Validation sample	V	80	11	.16
N=57	N	77	19	.25
Supervisory ratings	S	82	15	.08
	P	80	19	.27*
	Q	88	15	.20
	K	80	19	.15
	F	77	20	.32*
	M	89	20	.22
Cross Validation	G	82	15	.04
sample	V	83	14	.02
125.—*Continued*				
N=32	N	78	20	−.03
Piece-rate earnings	S	87	15	−.06
	P	81	21	.10
	Q	81	14	.04
	K	79	18	.13
	F	83	17	.24
	M	93	19	.17
Combined sample	G	79	14	....
N=89	V	81	12	....
	N	77	19	....
	S	84	15	....
	P	80	20	....
	Q	86	15	....
	K	80	19	....
	F	79	19	....
	M	90	20	....
126. Draftsman,	G	116	13	.46**
Architectural,	V	107	12	.32**
001.281	N	110	14	.45**
Draftsman,	S	120	14	.23**
Civil, 005.281	P	116	19	.13
Draftsman,	Q	118	14	.21**
Geological, 010.281	K	107	18	.11
Draftsman,	F	91	18	.03
Mechanical,	M	100	21	.02
007.281				
Draftsman,				
Structural, 005.281				
Detailer, 017.281	G	119	13	.49**
Validation sample	V	111	12	.33**
N=232	N	116	15	.44**
Supervisory ratings	S	122	16	.40**
Cross Validation	P	124	22	.42**
sample I	Q	120	16	.31**
N=60	K	113	20	.15
Supervisory ratings	F	97	17	−.01
	M	108	21	.19
Cross Validation	G	114	9	.41**
sample II	V	104	12	.30**
N=130	N	110	11	.29**
Instructors' ratings	S	124	14	.20*

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
126.—*Continued*				
	P	116	13	.23**
	Q	111	12	.25**
	K	102	18	.20*
	F	103	17	.12
	M	105	20	.16
Cross Validation	G	120	9	.32*
sample III	V	103	10	.28*
N=115 [18]	N	117	10	.19
Grade-point averages	S	132	14	.18
	P	128	16	.06
	Q	112	14	.20
	K	112	14	−.04
	F	110	16	−.02
	M	127	19	.16
Combined sample	G	116	12	....
N=537	V	106	12	....
	N	112	11	....
	S	123	15	....
	P	119	18	....
	Q	116	14	....
	K	108	18	....
	F	98	19	....
	M	107	23	....
127. Egg Candler,	G	92	15	.05
529.687	V	98	15	.02
N=52	N	86	16	.08
Supervisory ratings	S	92	18	.03
	P	100	17	−.05
	Q	100	14	.14
	K	104	17	.17
	F	102	17	.17
	M	115	20	.32*
128. Electric-Motor	G	85	18	.18
Assembler, 721.884	V	87	19	.14
N=60	N	80	18	.22
Supervisory ratings	S	90	20	.13
	P	87	24	.33**
	Q	83	16	.25
	K	99	19	.36**
128.—*Continued*				
	F	107	22	.20
	M	109	23	.34**
129. Electric Toothbrush	G	88	11	.15
Assembler, 723.884	V	89	10	.02
N=61	N	89	14	.19
Supervisory ratings	S	90	15	.12
	P	94	18	.19
	Q	104	10	.26*
	K	100	16	−.07
	F	102	20	.09
	M	106	18	.06
130. Electrical Technol-	G	121	11	.38**
ogy-Technical	V	109	11	.32*
Institute Training,	N	118	12	.31*
003.	S	126	14	.09
N=63	P	116	15	.04
Grade-point averages	Q	111	12	.08
	K	112	15	−.06
	F	110	19	−.12
	M	116	18	.01
131. Electrician, 824.281	G	104	13	.48**
Validation sample	V	96	14	.36**
N=124	N	102	14	.38**
Supervisory ratings	S	112	17	.32**
	P	101	15	.18*
	Q	93	12	.20*
	K	98	15	.16
	F	103	15	.22*
	M	106	18	.02
Cross Validation	G	107	14	.32**
sample	V	102	15	.22*
N=129	N	102	15	.30**
	S	111	16	.26**
	P	97	16	.19*
	Q	92	14	.24**
	K	94	17	.23**
	F	97	19	.15
	M	97	19	.20*
Combined ratings	G	106	14	....
N=253	V	99	15	....

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*Significant at the .05 level.

**Significant at the .01 level.

[18] N=52 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
131.—*Continued*				
	N	102	14	....
	S	111	16	....
	P	99	16	....
	Q	92	13	....
	K	96	16	....
	F	100	16	....
	M	102	19	....
132. Electrician, Airplane,	G	100	17	.34*
825.281	V	96	15	.24
Aircraft Mechanic,	N	97	18	.48**
Armament, 801.381	S	103	19	.24
N=51	P	93	15	.49**
Supervisory ratings	Q	87	13	.43**
	K	89	19	.48**
	F	95	18	.33*
	M	103	22	.42**
133. Electronic-Resistance-Spot-Welder,	G	91	15	.34*
	V	95	11	.36**
726.884	N	88	18	.25
N=50	S	97	17	.30*
Supervisory ratings	P	108	19	.13
	Q	106	17	.12
	K	110	16	.30*
	F	109	18	.11
	M	117	20	.01
134. Electro-Mechanical	G	87	14	.32*
Assembly	V	91	13	.18
Curriculum,	N	84	17	.41**
70XX; 72XX	S	96	17	.28*
N=50	P	94	21	.13
Instructors' ratings	Q	101	16	.18
	K	97	20	.14
	F	91	23	.17
	M	106	22	.10
135. Electronics	G	95	15	.23**
Assembler,	V	100	14	.13
726.781	N	89	16	.19*
Validation sample	S	100	17	.22**
N=147	P	104	18	.20*
Supervisory ratings	Q	105	16	.13
135.—*Continued*				
	K	111	16	.12
	F	108	18	.28**
	M	113	20	.29**
Cross Validation	G	101	16	.11
sample	V	101	13	.09
N=57	N	98	19	.00
Supervisory ratings	S	107	20	.17
	P	112	23	.30*
	Q	109	15	.15
	K	109	17	.30
	F	106	19	.14
	M	109	20	.25
Combined sample	G	97	15	....
N=204	V	100	13	....
	N	92	17	....
	S	102	18	....
	P	106	20	....
	Q	106	16	....
	K	110	16	....
	F	107	18	....
	M	112	20	....
136. Electronics	G	114	14	.43**
Foreman,	V	105	15	.37**
726.134	N	110	13	.18
N=72	S	118	18	.17
Supervisory ratings	P	114	16	.03
	Q	109	12	.18
	K	109	15	.20
	F	104	20	.23*
	M	121	19	.02
137. Electronics	G	119	12	.40**
Mechanic, 726.281	V	114	14	.28
N=50	N	114	10	.11
Supervisory ratings	S	116	21	.35*
	P	107	15	.30*
	Q	108	13	.21
	K	112	16	.01
	F	108	16	−.07
	M	106	19	−.01

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*Significant at the .05 level.
**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
138. Electronics Tech-	G	118	9	.50**	142.—*Continued*				
nician, 003.181	V	107	9	.43**	Civil Engineer,	P	113	14	....
N=97	N	115	11	.33	005.081	Q	119	14	....
Grade-point averages	S	124	13	.03	Electrical Engineer,	K	116	18	....
	P	117	16	.03	003.081	F	104[19]	17	....
	Q	113	13	.16	Mechanical Engineer,	M	103[19]	19	....
	K	110	18	.12	007.081				
	F	111	18	.17	*Validation sample*				
	M	110	20	.10	*N=60*				
139. Employment Clerk,	G	104	14	.52**	Supervisory ratings				
205.368	V	113	16	.51**	*Cross Validation*	G	138	12	....
N=57	N	107	12	.46**	*sample I*	V	129	14	....
Supervisory ratings	S	90	16	.27*	*N=214*	N	129	11	....
	P	92	16	.39**	School grades	S	133	14	....
	Q	116	17	.38**		P	124	16	....
	K	110	18	.30*		Q	119	16	....
	F	90	20	.26		K	....	....	....
	M	95	24	.26		F	....	....	....
140. Encoder, 209.588	G	104	17	.11		M	....	....	....
N=50	V	105	17	.00	*Cross Validation*	G	130	12	.42**
Production records	N	106	18	.19	*sample II*	V	119	15	.40**
	S	103	20	.14	*N=150*	N	122	12	.38**
	P	120	18	.17	School grades	S	130	14	.11
	Q	119	13	.12		P	118	12	.11
	K	116	17	.26		Q	110	15	.30**
	F	106	24	.00		K	113	17	.25**
	M	108	24	.28*		F	106	18	.08
141. Engineer, 197.130	G	113	12	.58**		M	111	17	.01
N=64	V	104	12	.47**	*Combined sample*	G	135	13	....
Grade-point averages	N	114	11	.47**	*N=424*	V	126	16	....
and performance	S	114	20	.25*		N	120	12	....
ratings	P	119	14	.41**		S	131	14	....
(Correlations shown	Q	114	12	.36**		P	120	19	....
are for grade-	K	111	18	.13		Q	116	18	....
point averages)	F	102	17	.39**		K	....	....	....
	M	124	20	−.14		F	....	....	....
142. Engineer, Selected	G	139	12	....		M	....	....	....
Classifications	V	133	14	....					
Chemical Engineer,	N	131	10	....					
008.081	S	130	12	....					

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*Significant at the .05 level.

**Significant at the .01 level.

[19] N=59.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
143. Engineering Aid II,	G	112	12	.40**	147.—*Continued*				
019.281	V	101	13	.29*		Q	104	18	.26
N=57	N	107	14	.40**		K	104	15	.29*
Grade point averages	S	123	18	.17		F	95	19	.36**
	P	113	16	.40**		M	113	18	.20
	Q	105	12	.35**	148. Extruding-Machine	G	97	14	.18
	K	103	13	.07	Operator,	V	91	13	.14
	F	106	21	.13	691.782	N	98	15	.25*
	M	110	19	.14	*N=84*	S	101	17	−.02
144. Envelope-Machine	G	92	15	.34*	Supervisory ratings	P	98	16	.01
Set-Up Man,	V	90	13	.29*		Q	99	13	−.07
641.780	N	90	17	.26		K	99	17	.11
N=51	S	98	19	.28*		F	101	16	.03
Supervisory ratings	P	95	19	.22		M	117	22	.06
	Q	96	10	.22	149. Fancy Stitcher,	G	93	13	.28**
	K	96	20	.37**	690.782	V	93	14	.19*
	F	98	18	.11	Top Stitcher,	N	91	16	.30**
	M	106	20	.11	690.782	S	94	15	.29**
145. Experimental	G	100	15	.41*	Vamp Stitcher,	P	96	16	.50**
Assembler,	V	97	12	.46*	690.782	Q	98	15	.44**
739.381	N	97	16	.26	*N=113*	K	101	16	.53**
N=61	S	108	19	.37*	Supervisory ratings	F	94	20	.49**
Supervisory ratings	P	96	18	.37*		M	101	18	.46**
	Q	97	12	.29	150. Farm Hand, Dairy I,	G	88	18	.40**
	K	96	16	.44*	411.884	V	....	....	....
	F	101	20	.39*	*N=54*	N	....	....	....
	M	107	20	−.01	Grade-point averages	S	93	19	.38**
146. Exterminator,	G	97	16	.09	for classroom and	P	88	21	.31*
389.884	V	96	17	.02	on-the-job training	Q	....	....	....
N=55	N	95	16	.06	[Non-Verbal GATB,	K	90	17	.34*
Supervisory ratings	S	98	20	.12	using IPAT test of	F	87	18	.32*
	P	94	21	.13	"G" administered]	M	92	23	.36**
	Q	98	16	.14	151. Fettler, 779.884	G	78	13	.12
	K	98	18	.17	*N=35*	V	83	14	.12
	F	96	20	.22	Supervisory ratings	N	80	17	.18
	M	111	23	.43**		S	84	16	.06
147. Extruder Operator,	G	102	19	.19		P	84	21	.03
557.782	V	100	19	.15		Q	86	14	.07
N=57	N	100	20	.18		K	88	19	.15
Supervisory ratings	S	104	19	.20		F	88	17	.44**
	P	101	17	.09		M	93	20	.34*

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
152. File Clerk II,	G	109	14	.28*	156.—*Continued*				
206.388	V	113	19	.44**		Q	96	13	.44**
N=50	N	102	17	.19		K	96	13	.39**
Supervisory ratings	S	106	16	−.23		F	102	15	.18
	P	105	13	−.22		M	111	20	.05
	Q	109	12	.51**	157. Fireworks	G	88	15	.39**
	K	104	19	−.06	Assembler,	V	91	16	.05
	F	106	17	−.17	737.887	N	86	18	.55**
	M	100	17	−.22	*N*=75	S	94	17	.35**
153. Finisher, Hand,	G^{20}	98	16	.27	Supervisory ratings	P	88	15	.40**
754.884	V^{20}	98	16	.15		Q	87	15	.45**
N=50	N^{20}	97	18	.26		K	91	20	.43**
Supervisory ratings	S	98	18	.32*		F	109	17	.69**
	P	106	19	.45**		M	114	18	.57**
	Q^{20}	108	16	.28*	158. Fish and Game	G	100	13	.36**
	K	109	15	.35*	Warden, 379.168	V	96	11	.26*
	F	107	22	.40**	*N*=80	N	98	12	.33**
	M	109	22	.43**	Supervisory ratings	S	102	17	.24*
154. Finisher, Hand,	G	80	12	.10		P	95	16	.33**
731.887	V	87	12	.12		Q	97	13	.24*
Toy Assembler,	N	76	15	.14		K	98	18	.26*
Plastic, 731.887	S	88	16	−.07		F	87	23	.27*
Toy Assembler,	P	93	16	−.19		M	96	23	.32**
Metal, 731.884	Q	95	14	.12	159. Fish Cleaner,	G	95	16	.05
N=75	K	99	15	.14	525.884	V	100	15	.00
Supervisory ratings	F	92	17	−.17	*N*=51	N	89	17	.12
	M	103	20	.04	Supervisory ratings	S	95	16	.08
155. Fire Fighter,	G	106	12	.49**		P	98	19	.09
373.884	V	100	12	.29*		Q	97	14	.06
N=60	N	106	14	.47**		K	100	17	.01
Supervisory ratings	S	109	15	.38**		F	96	21	.31*
	P	103	12	.53**		M	98	20	.12
	Q	101	12	.48**	160. Fishing-Rod	G	98	16	.40**
	K	103	14	.34**	Assembler,	V	99	15	.39**
	F	104	16	.38**	723.884	N	95	18	.34**
	M	109	15	.33*	*N*=56	S	99	18	.20
156. Firesetter,	G	100	13	.12	Supervisory ratings	P	97	19	.52**
692.380	V	97	13	−.05		Q	102	14	.40**
N=52	N	99	16	.23		K	100	17	.48**
Supervisory ratings	S	97	16	−.02		F	98	18	.58**
	P	95	14	.23		M	106	20	.58**

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*Significant at the .05 level.

**Significant at the .01 level.

[20] N=49.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
161. Flatwork Jobs,	G	72	13	.08	162.—*Continued*				
363.886	V	79	11	.19		F	92	17	−.03
Assembler, 369.687	N	69	16	.08		M	106	20	.30**
Flatwork Catcher,	S	81	16	−.10	163. Folding-	G	97	15	.42**
363.886	P	76	22	.15	Machine	V	95	15	.36**
Flatwork Feeder,	Q	83	14	.10	Operator,	N	96	15	.33*
363.886	K	91	20	.01	653.782	S	98	18	.33*
Flatwork Finisher,	F	80	20	.12	$N=50$	P	95	15	.17
363.886	M	91	21	.23*	Supervisory ratings	Q	99	11	.28
Flatwork Folder,						K	95	18	−.07
363.886						F	94	19	.18
Trucker, Hand,						M	96	20	−.02
929.887					164. Food Service,	G	108	9	.10
Validation sample					Supervisor, 319.138	V	101	8	.25
$N=75$					$N=50$	N	110	16	.03
Supervisory rating					Grade-point averages	S	107	16	.03
Cross Validation	G	79	15	.38**		P	120	14	−.12
sample	V	84	15	.22		Q	119	10	.05
$N=74$	N	71	19	.36**		K	108	15	.08
Supervisory ratings	S	85	16	.22		F	100	17	.01
	P	79	21	.30*		M	116	17	−.09
	Q	87	15	.31**	165. Food Service	G	82	13	.04
	K	94	21	.25**	Worker II,	V	85	28	−.03
	F	89	21	.34**	317.884	N	80	27	.03
	M	103	29	.42**	$N=100$	S	91	33	.05
Combined sample	G	75	14	....	Supervisory ratings	P	85	21	.03
$N=149$	V	81	13	....		Q	91	15	−.01
	N	70	18	....		K	91	19	.22*
	S	83	16	....		F	87	18	.26**
	P	77	22	....		M	97	17	.35**
	Q	85	15	....	166. Forester, 040.081	G	124	12	.06
	K	92	21	....	$N=80$	V	121	12	.12
	F	84	21	....	Supervisory ratings	N	117	12	.20
	M	97	26	....		S	117	18	−.08
162. Flexographic	G	97	17	.22		P	108	14	.16
Press Man I,	V	92	14	.12		Q	112	14	.13
651.782	N	96	19	.19		K	110	18	.26*
$N=75$	S	101	18	.26*		F	99	21	.15
Supervisory ratings	P	96	22	.23*		M	102	20	.17
	Q	96	16	.20					
	K	96	18	.16					

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*Significant at the .05 level.

**Significant at the .01 level.

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***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
167. Forester Aid,	G	113	10	.29*	171.—*Continued*				
441.384	V	107	12	.10	Olive Sorter,	P	86	21	.24*
N=78	N	108	12	.38**	529.687	Q	92	17	.18
Instructors' ratings	S	116	13	.10	Packer, 920.887	K	97	20	.18
	P	114	16	.12	Apple Packer,	F	96	20	.23*
	Q	107	13	.27*	920.887	M	96	25	.21*
	K	103	13	.24*	Cherry Packer,				
	F	100	19	.12	920.887				
	M	111	21	.10	Citrus-Fruit				
168. Fork-Lift-	G	87	12	.28*	Packer, 920.887				
Truck Operator,	V	86	12	.11	Plum Packer,				
922.883	N	88	17	.32**	920.887				
N=66	S	89	15	.21	*N=327* [21]				
Supervisory ratings	P	87	16	.18	Supervisory ratings				
	Q	92	13	.11	172. Garment Folder,	G	84	16	.35**
	K	100	17	.22	789.887	V	91	18	.17
	F	95	19	.14	*N=55*	N	79	18	.35**
	M	108	18	.14	Supervisory ratings	S	87	18	.47**
169. Fountain Girl,	G	95	18	.04		P	94	19	.56**
319.878	V	98	18	.00		Q	92	18	.46**
N=100	N	95	18	.11		K	93	19	.70**
Supervisory ratings	S	95	20	.05		F	100	15	.61**
	P	101	21	.11		M	103	18	.60**
	Q	104	15	.14	173. Garment Looper,	G	80	10	.22
	K	104	15	.11	689.782	V	81	10	.01
	F	99	20	.21*	*N=52*	N	80	14	.17
	M	102	21	.28**	Supervisory ratings	S	88	14	.23
170. Fourdrinier-Machine	G	97	16	.53**		P	91	18	.25
Tender, 539.782	V	92	13	.36**		Q	94	13	.00
Back Tender, Paper	N	96	17	.47**		K	108	14	.32*
Machine, 534.782	S	100	18	.41**		F	111	14	.50**
N=84	P	98	20	.38**		M	115	16	.32*
Supervisory ratings	Q	101	12	.39**	174. Garment Packer,	G	96	15	.30*
	K	96	19	.39**	920.887	V	92	13	.33*
	F	82	19	.41**	*N=51*	N	94	20	.30*
	M	91	23	.30**	Supervisory ratings	S	106	17	.02
171. Fruit Sorter,	G	89	16	.08		P	107	18	.30*
529.687	V	91	16	.09		Q	104	15	.33*
Cherry Sorter,	N	83	19	.16		K	107	16	.26
529.687	S	92	17	.07		F	96	20	.18
						M	103	18	.04

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*Significant at the .05 level.

**Significant at the .01 level.

[21] N=94 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations—*Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
175. Gasoline Engine	G	93	15	....
Assembler, 806.781	V	93	15	....
Internal-Combustion	N	91	15	....
Engine Assembler,	S	101	19	....
806.781	P	103	17	....
Outboard-Motor	Q	92	12	....
Assembler, 806.781	K	93	17	....
Validation sample	F	106	20	....
N=59	M	109	21	....
Supervisory ratings	G	92	15	.30*
	V	96	15	.15
	N	91	15	.28*
	S	94	20	.29*
	P	96	19	.30*
	Q	98	16	.24
	K	98	20	.34*
	F	100	20	.52**
	M	98	22	.44**
Cross Validation sample	G	93	15	....
	V	94	15	....
N=45	N	91	15	....
Supervisory ratings	S	98	20	....
Combined sample	P	100	19	....
N=104	Q	94	13	....
	K	96	18	....
	F	103	20	....
	M	104	22	....
176. Gas-Pump-	G	100	16	.24
Computer	V	97	12	.15
Assembler,	N	100	15	.21
710.884	S	102	21	.45**
N=52	P	110	21	.43**
Supervisory ratings	Q	109	14	.21
	K	109	14	.11
	F	109	18	.28*
	M	117	18	.22
177. Gas Serviceman,	G	95	15	.52**
637.281	V	97	13	.45**
N=51	N	89	18	.46**
Supervisory ratings	S	101	15	.26
177.—*Continued*				
	P	89	19	.36**
	Q	95	13	.23
	K	97	21	.27
	F	90	22	.23
	M	106	22	.25
178. General Labor	G	100	14	.47*
Worker, 899.887	V	94	10	.44*
N=61	N	104	18	.47*
Supervisory ratings	S	101	16	.22
	P	107	16	.60*
	Q	102	16	.58*
	K	106	16	.52
	F	94	17	.35*
	M	113	17	.52*
179. General Practitioner,	G	135	11	.51**
070.108	V	136	14	.45**
N=49	N	126	12	.39**
Grade-point averages	S	123	11	.41**
	P	122	13	.12
	Q	121	18	.14
	K	101	24	.01
	F	94	17	−.01
	M	107	21	−.06
180. Glass Blower,	G	109	12	−.08
Laboratory	V	99	10	−.25
Apparatus, 772.281	N	107	10	.02
N=50	S	115	16	.31*
Course grades	P	112	12	.36*
	Q	102	11	−.11
	K	104	14	.00
	F	103	18	.19
	M	115	20	.22
181. Glazier, 865.781	G	107	14	.23
N=55	V	100	14	.14
Supervisory ratings	N	103	14	.09
	S	111	16	.37**
	P	99	13	.20
	Q	100	14	.15
	K	99	17	−.04

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
181.—*Continued*	F	92	17	−.11
	M	104	17	−.08
182. Goggle-Glass Cutter, 713.884 Lens Cutter II, 713.884 *N=50* Supervisory ratings	G	91	12	−.18
	V	93	11	−.08
	N	91	14	.07
	S	91	14	−.11
	P	96	19	.10
	Q	98	15	.15
	K	101	16	.28*
	F	100	18	.27
	M	106	21	.00
183. Grid Operator, 725.884 *N=63* Supervisory ratings and production records (Correlations shown are for supervisory ratings)	G	97	15	.22
	V	97	14	.15
	N	96	16	.19
	S	98	15	.22
	P	104	16	.29*
	Q	106	14	.28*
	K	102	17	.19
	F	105	18	.38**
	M	112	18	.25*
184. Grocery Checker, 299.468 *N=237*[23] Instructors' ratings and scores on work sample of "checking."	G	110	14	.33**
	V	108	16	.17
	N	108	13	.46**
	S	109	19	.14
	P	111	15	.26**
	Q	112	15	.26**
	K	110	15	.02
	F	104	18	.18
	M	108	17	.08
185. Gyroscope Assembler, 710.884 *N=50* Supervisory ratings	G	94	14	.12
	V	96	14	.01
	N	88	16	.04
	S	97	17	.33*
	P	97	15	.17
	Q	97	14	.29*
	K	100	18	.04
	F	107	19	.32*
	M	108	18	.13
186. Hand Sewer, Shoes, 788.884	G	90	16	.25*
	V	87	14	.08
186.—*Continued* *Validation sample* *N=64* Instructors' ratings	N	86	19	.20
	S	100	19	.35**
	P	95	19	.15
	Q	93	14	.20
	K	95	19	.19
	F	99	25	.36**
	M	114	25	.33**
Cross Validation sample I *N=39* Supervisory ratings	G	95	15	.22
	V	96	13	.07
	N	98	16	.37*
	S	94	17	.19
	P	102	17	.13
	Q	102	15	.25
	K	102	17	−.01
	F	101	20	.25
	M	102	19	.42**
Cross Validation sample II *N=53* Supervisory ratings	G	98	16	.20
	V	96	15	.08
	N	98	16	.13
	S	103	16	.15
	P	113	18	−.05
	Q	112	16	.04
	K	104	18	.22
	F	100	19	.13
	M	105	19	.45**
Combined sample *N=156*	G	94	16	....
	V	92	15	....
	N	93	18	....
	S	99	18	....
	P	103	20	....
	Q	102	17	....
	K	100	19	....
	F	100	22	....
	M	108	22	....
187. Heat Treater I, 504.782 Heat Treater II, 504.782 *N=78* Supervisory ratings	G	88	21	.27*
	V	89	17	.21
	N	82	24	.22
	S	93	21	.30**
	P	90	23	.26*

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*Significant at the .05 level.

**Significant at the .01 level.

[23] N=145 for r's (work sample criterion).

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
178.—*Continued*				
	Q	99	18	.33**
	K	91	22	.20
	F	87	22	.29
	M	100	24	.16
188. Hosiery Looper,	G	96	14	.26*
689.782	V	97	14	.16
N=87	N	98	16	.18
Supervisory ratings	S	97	15	.17
	P	104	14	.11
	Q	106	13	.23*
	K	106	13	.19
	F	100	19	.17
	M	101	18	.11
189. Hospital Admitting	G	101	14	.61**
Clerk, 237.368	V	109	14	.55**
N=59	N	95	16	.57**
Instructors' ratings	S	97	13	.36**
	P	94	12	.36**
	Q	108	14	.31*
	K	111	17	.25
	F	94	19	.08
	M	99	21	.13
190. Illustrator, 141.081	G	116	11	.16
N=52	V	106	11	.09
Grade-point averages	N	108	12	.03
	S	131	15	.10
	P	134	16	.08
	Q	120	15	.07
	K	111	14	.11
	F	110	19	.22
	M	117	20	−.01
191. Industrial Chemistry	G	126	12	.46**
Technology-	V	116	10	.26*
Technical Institute	N	124	15	.20
Training, .008	S	122	16	.41**
N=55	P	122	13	.28*
Grade-point averages	Q	117	16	.04
	K	116	16	−.04
	F	104	16	.01
	M	116	16	−.03
192. Industrial Tech-	G	120	10	.11
nology-Technical	V	107	09	.25
Institute Training,	N	118	12	.16
012.	S	122	16	−.23
N=52	P	120	18	−.04
Grade-point averages	Q	112	13	.18
	K	111	14	.22
	F	111	17	−.06
	M	118	18	−.07
193. Ingot Mold Foundry	G	103	11	.02
Jobs	V	97	10	−.20
Hand Rammer,	N	103	13	.09
518.381	S	105	18	.00
Sand-Slinger	P	110	15	.25
Operator, 518.883	Q	104	13	.04
Knockoutman,	K	107	14	.11
519.887	F	98	16	−.06
Validation sample	M	112	20	.25
N=71	G	101	10	.04
Supervisory ratings	V	93	09	−.02
Cross Validation	N	104	13	.06
sample	S	105	18	.11
N=73	P	108	18	.18
Supervisory ratings	Q	101	12	.14
	K	109	17	.31 #
	F	96	18	.27
	M	116	21	.48 #
Combined sample	G	102	11	.03
N=144	V	95	10	−.11
	N	104	13	.08
	S	105	18	.06
	P	109	17	.21
	Q	103	13	.09
	K	108	16	.22 #
	F	97	17	.12
	M	115	21	.37 #

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*Significant at the .05 level.

**Significant at the .01 level.

# Correlation more than twice the standard error.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
194. Inhalation Therapist,	G	106	17	.26*
079.368	V	108	15	.23*
N=81	N	101	16	.14
Supervisory ratings	S	109	18	.36**
	P	106	18	.26*
	Q	110	14	.13
	K	109	14	.22*
	F	99	19	.36**
	M	105	19	.13
195. Injection-Molding-	G	98	13	.22
Machine Tender,	V	96	14	.15
556.885	N	97	16	.28*
N=74	S	97	15	.09
Supervisory ratings	P	100	15	.52**
	Q	102	14	.46**
	K	104	18	.58**
	F	97	21	.48**
	M	108	21	.46**
196. Inspector, 712.887	G	92	12	.51*
Inspector, Plastic,	V	92	11	.34*
712.687	N	95	15	.31
N=55	S	92	18	.46*
Supervisory ratings	P	105	16	.18
	Q	106	13	.20
	K	104	15	.19
	F	98	18	.28
	M	104	21	.13
197. Inspector, Assemblies	G	110	12	.56**
and Installations,	V	105	12	.43**
806.381	N	106	12	.49**
N=81	S	111	18	.22*
Course grades	P	110	17	.28*
	Q	110	14	.29**
	K	102	18	.30**
	F	98	20	.11
	M	108	20	.13
198. Inspector,	G	113	16	.45**
Mechanical and	V	107	16	.27
Electrical, 710.384	N	109	16	.45**
N=50	S	113	20	.38**
Supervisory ratings	P	108	21	.36**
198.—*Continued*				
	Q	107	12	.30*
	K	102	19	.15
	F	103	18	.10
	M	108	19	.29*
199. Inspector-Packer,	G	77	11	.14
774.387	V	84	09	−.01
N=50	N	75	14	.13
Supervisory ratings	S	82	12	.05
	P	80	16	.32*
	Q	84	12	.40**
	K	92	15	.47**
	F	95	16	.06
	M	89	16	.43**
200. Inspector, Sub-	G	91	16	.03
assemblies,	V	93	14	.04
726.384	N	91	16	−.09
N=51	S	91	18	.06
Supervisory ratings	P	96	16	.09
	Q	101	14	−.08
	K	101	21	.03
	F	104	18	−.04
	M	114	20	.10
201. Inspector and	G	94	15	.03
Machine Operator,	V	96	13	.14
Diode Sub-	N	92	16	−.10
assemblies,	S	102	18	.02
726.685	P	118	16	.14
N=52	Q	112	15	−.04
Supervisory ratings	K	113	16	.03
	F	113	21	.11
	M	111	15	−.01
202. Inspectors, Selected,	G	99	19	.44**
Crusher Inspector,	V	91	17	.30*
619.685	N	97	18	.42**
Mill-End Inspector,	S	105	19	.42**
619.687	P	95	15	.31**
Mill Inspector,	Q	87	13	.27*
619.387	K	86	18	.16

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
202.—*Continued*					204.—*Continued*				
Pipe and Coupling	F	95	20	.23		K	101	16	.22
Sizer, 619.687	M	97	19	.29		F	99	18	.12
Pipe Walker, 619.687						M	108	18	.12
Thread Inspector,					205. Insulation-Blanket	G	92	16	−.10
619.687					Maker, 809.884	V	96	17	−.10
N=70					*N=55*	N	90	16	.12
Supervisory ratings					Supervisory ratings	S	90	16	−.13
203. Instrument Repair-	G	110	15	.42**		P	92	17	.11
man I, 710.281	V	102	14	.31*		Q	98	14	.11
Validation sample	N	107	14	.34**		K	100	16	−.01
N=65	S	118	18	.27*		F	102	19	.12
Course grades	P	110	16	.12		M	107	20	.17
	Q	107	14	.06	206. Insulation Worker,	G	99	16	.13
	K	110	16	.06	863.884	V	95	15	−.04
	F	107	17	.06	*N=50*	N	97	21	.20
	M	120	21	−.06	Supervisory ratings	S	105	18	−.08
Cross Validation	G	106	13	.26		P	99	18	.02
sample	V	103	13	.14		Q	106	16	.01
N=58	N	103	13	.29*		K	102	25	.24
Instructors' ratings	S	107	20	.24		F	82	18	.27
	P	99	16	.39**		M	92	19	.29*
	Q	102	14	.21	207. Intercom Service-	G	108	14	.32*
	K	94	18	.24	man II, 829.281	V	102	14	.31*
	F	91	20	.02	*N=53*	N	104	15	.17
	M	97	23	.13	Supervisory ratings	S	110	16	.21
Combined sample	G	108	14	....		P	100	14	−.02
N=123	V	102	14	....		Q	102	13	.17
	N	105	14	....		K	94	17	−.04
	S	113	20	....		F	102	19	.35*
	P	105	17	....		M	110	20	.12
	Q	105	14	....	208. Iron and Steel Jobs,	G	88	15	.26*
	K	102	18	....	Laborer, General	V	86	12	.10
	F	99	20	....	509.886	N	87	16	.16
	M	109	25	....	Coil-Opener-and-	S	93	18	.45**
204. Insulating-Machine	G	94	15	.17	Down-Ender Oper-	P	85	16	.41**
Operator, 691.782	V	92	13	.01	ator, 613.782	Q	77	13	.14
N=54	N	92	17	.11	Conveyor Man II,	K	76	18	.32*
Supervisory ratings	S	104	18	.26	921.883	F	91	20	.56**
	P	101	18	.35**	Cooling-Conveyor	M	91	19	.55**
	Q	98	14	.19	Operator, 921.883				

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
208.—*Continued*				
Tester-Conveyor Operator, 921.883				
Thread-Entry-Conveyor Operator, 921.883				
Yard-Transfer-Conveyor Operator, 921.883				
N=64				
Supervisory ratings				
209. Job Analyst, 166.088	G	124	10	.13
N=59	V	126	12	−.03
Supervisory ratings	N	118	11	.00
	S	110	18	.28*
	P	107	14	.15
	Q	122	15	−.05
	K	116	14	.04
	F	111	29	.28*
	M	115	29	.42**
210. Key-Punch Operator,	G	101	13	.28**
213.582	V	101	13	.21*
N=193 [23]	N	100	14	.36**
Supervisory ratings	S	100	15	.09
	P	106	16	.28**
	Q	115	14	.28**
	K	108	15	.01
	F	104	17	−.01
	M	103	19	−.07
211. Knitting-Machine	G	95	15	.35*
Fixer, Socks,	V	93	14	.30*
689.280	N	91	15	.31*
N=51	S	94	16	.41**
Supervisory ratings	P	86	18	.36**
	Q	90	14	.27
	K	89	15	.15
	F	100	16	−.04
	M	99	22	−.18
212. Laboratory Tester I,	G	123	14	....
029.281	V	123	16	....
N=118	N	119	12	....
Supervisory ratings				
212.—*Continued*				
	S	116	17	....
	P	117	16	....
	Q	120	15	....
	K	114	17	....
	F	107	21	....
	M	104	19	....
213. Laborer, Bakery,	G	92	18	.56**
929.886	V	95	15	.42**
N=57	N	93	20	.59**
Supervisory ratings	S	94	20	.31*
	P	101	24	.42*
	Q	104	18	.47**
	K	112	14	.44**
	F	104	17	.23
	M	117	21	.30*
214. Ladies'-Hat Trimmer	G	86	13	.14
784.884	V	86	13	.02
N=34	N	83	18	.00
Production records	S	94	14	.22
	P	90	15	.06
	Q	84	14	−.13
	K	89	20	.35*
	F	91	21	.48**
	M	89	20	.25
215. Lather, 842.781	G	103	17	.31*
N=64	V	99	14	.37**
Supervisory ratings	N	97	17	.18
	S	111	17	.13
	P	103	18	−.15
	Q	98	13	.07
	K	98	18	.03
	F	93	19	.09
	M	107	23	−.03
216. Lemon Picker,	G	....	....	....
404.887	V	....	....	....
N=50	N	....	....	....
Supervisory ratings	S	92	17	−.11
	P	85	23	.23
	Q	84	17	.09

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*Significant at the .05 level.

**Significant at the .01 level.

[23] N=91 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
206.—*Continued*				
	K	86	22	.25
	F	82	21	.10
	M	88	22	.22
217. Levers-Lace Machine	G	88	15	.17
Operator, 683.782	V	86	12	−.03
N=54	N	86	17	.09
Supervisory ratings	S	92	19	.10
	P	96	16	.29*
	Q	98	12	.01
	K	94	15	.05
	F	95	17	.23
	M	109	18	.30*
218. Librarian, 100.168	G	118	15	.23**
Validation sample	V	128	16	.18**
N=281 [24]	N	108	15	.29*
Supervisory ratings	S	105	18	.08
	P	102	20	.20**
	Q	122	18	.25**
	K	114	17	.20**
	F	94	21	.19**
	M	90	21	.20**
Cross Validation	G	124	12	.33**
sample	V	130	13	.15
N=85	N	116	13	.38**
Grade-point averages	S	115	16	.19
	P	118	20	.34**
	Q	132	16	.37**
	K	118	16	.29**
	F	96	18	.19
	M	97	22	.26*
Combined sample	G	120	15	....
N=366	V	128	15	....
	N	110	15	....
	S	108	18	....
	P	106	21	....
	Q	124	18	....
	K	115	17	....
	F	94	20	....
	M	91	22	....
219. Light-Bulb,	G	90	14	.10
Assembler, 692.885	V	92	13	.08
N=50	N	84	15	.18
Supervisory ratings	S	94	17	−.04
	P	98	19	.01
	Q	100	12	.12
	K	105	16	.00
	F	111	16	.23
	M	110	18	.36*
220. Lineman, Repair,	G	102	14	.19
821.381	V	100	14	.20
N=59	N	99	14	.24
Supervisory ratings	S	99	14	.01
	P	93	16	−.13
	Q	96	13	.10
	K	92	18	.29*
	F	88	19	−.02
	M	98	20	.15
221. Linen-Supply-Load	G	85	18	.21
Builder, 920.687	V	91	16	−.20
N=50	N	82	17	.15
Supervisory ratings	S	89	18	.16
	P	90	22	.07
	Q	94	15	.32*
	K	100	15	.14
	F	94	19	.14
	M	104	20	.16
222. Linotype Operator,	G	102	13	.37**
650.582	V	98	14	.25**
N=164	N	101	13	.39**
Instructors' rating	S	105	16	.24**
	P	101	16	.36**
	Q	101	13	.31**
	K	100	17	.32**
	F	95	20	.27**
	M	104	21	.25**

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*Significant at the .05 level.

**Significant at the .01 level.

[24] N=230 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
223. Loader, 920.887	G	92	16	.29*	227.—*Continued*				
N = *55*	V	94	12	.15		Q	87	13	−.15
Supervisory ratings	N	95	16	.44**		K	97	14	.18
	S	92	16	.16		F	103	16	.43**
	P	102	18	.31*		M	108	16	.27
	Q	102	14	.33*	228. Machine Operator,	G	99	12	.33*
	K	105	17	.34*	Mass Mailing,	V	98	12	.20
	F	104	25	.34*	234.885	N	98	16	.26
	M	113	23	.32*	*N* = *51*	S	100	15	.24
224. Log Scaler, 941.488	G	106	16	.39**	Production records	P	108	17	.62**
N = *75*	V	103	16	.28*		Q	122	18	.19
Supervisory ratings	N	99	15	.49**		K	106	16	.61**
	S	108	17	.22		F	103	17	.52**
	P	104	21	.37**		M	106	22	.75**
	Q	106	14	.42**	229. Machine Operators,	G	100	14	.07
	K	100	18	.33**	Selected	V	96	13	.00
	F	85	20	.12	Cold-Mill Operator,	N	97	16	.10
	M	100	24	.11	613.782	S	106	18	.12
225. Loom Fixer, 683.280	G	86	14	.33*	Hot-Mill Operator,	P	97	14	.43**
N = *50*	V	84	14	.22	613.782	Q	99	12	.20
Supervisory ratings	N	82	17	.36**	Payoff Operator,	K	101	15	.22
	S	91	17	.24	503.885	F	95	16	.35*
	P	84	16	.30*	Rewind Operator,	M	104	17	.29*
	Q	75	14	.30*	509.782				
	K	83	18	.38**	Slitting-Machine				
	F	93	16	.24	Operator II,				
	M	99	18	.16	615.782				
226. Luggage-Hardware	G	82	15	.17	*N* = *51*				
Assembler, 706.884	V	87	13	.17	Supervisory ratings				
N = *51*	N	83	18	.21	230. Machine Operators,	G	86	17	.73**
Supervisory ratings	S	82	17	.12	Selected	V	83	16	.62**
	P	89	18	.40**	Cold-Saw Operator,	N	87	16	.76**
	Q	103	20	.31*	607.782	S	92	20	.72**
	K	97	16	.38**	Cold-Sizing-Mill	P	89	20	.50**
	F	104	18	.45**	Operator,	Q	78	15	.65**
	M	102	19	.51**	613.782	K	85	22	.55**
227. Machine Attendant,	G	82	13	−.07	Decambering-Mill	F	88	19	.63**
619.885	V	86	13	−.07	Operator, 613.782	M	92	22	.58**
N = *50*	N	79	16	−.22	Flying-Cut-Off-				
Supervisory ratings	S	86	17	−.03	Machine Operator,				
	P	84	17	−.08	619.782				

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
230.—*Continued*				
Rotary-Straightener-Operator, 613.782				
Straightener-Machine Operator, 613.782				
Tube-Straightener Operator, 613.782				
Welder, Pipe Making, 616.380				
Welder, Assistant, Pipe Making, 616.380				
N=54				
Supervisory ratings				
231. Machinery Erector,	G	98	14	.30*
638.281	V	94	11	.18
N=55	N	93	16	.30*
Supervisory ratings	S	103	19	.17
	P	96	19	.14
	Q	99	12	.22
	K	88	17	.07
	F	94	21	.13
	M	100	19	.19
232. Machining Operator,	G	81	14	.22
Ceramics,	V	85	12	.27
679.885	N	76	19	.11
N=51	S	87	14	.02
Supervisorv ratings	P	86	19	.13
	Q	88	16	.16
	K	89	18	.09
	F	99	20	.16
	M	90	19	.09
233. Machinist I,	G	103	15	.29*
600.280	V	99	16	.16
Validation sample	N	100	13	.18
N=71	S	109	18	.36**
Supervisory ratings	P	98	19	.27*
	Q	90	14	.30*
	K	91	19	.08
	F	93	22	−.02
	M	99	22	.08

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
233.—*Continued*				
Cross Validation	G	103	17	.60**
sample I	V	93	16	.50**
N=40	N	95	19	.62**
Instructors' ratings	S	117	16	.34*
	P	103	17	.16
	Q	87	14	.30*
	K	91	15	.25
	F	102	21	.13
	M	101	18	.07
Cross Validation	G	106	13	.42**
sample II	V	....	....	....
N=66	N	106	13	.43**
Supervisory ratings	S	108	19	.28**
and Blue Print	P	....	....	....
reading scores	Q	....	....	....
(Correlations shown	K	....	....	....
are for supervisory	F	....	....	....
ratings)	M	118	17	.24*
Combined sample	G	104	15	....
N=177	V^{25}	96	16	....
	N	101	15	....
	S	111	18	....
	P^{25}	101	18	....
	Q^{25}	88	14	....
	K^{25}	91	17	....
	F^{26}	97	22	....
	M	106	19	....
234. Maintenance Man,	G	89	15	.33**
Building, 899.381	V	91	14	.35**
N=86	N	85	17	.37**
Instructors' ratings	S	92	16	.19
	P	92	18	.35**
	Q	89	13	.24*
	K	85	22	.04
	F	75	20	.27*
	M	88	24	.18

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*Significant at the .05 level.

**Significant at the .01 level.

[25] N=111.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
235. Maintenance Man,	G	113	11	.75*
Factory or Mill,	V	107	14	.50*
899.281	N	110	13	.52*
N=53	S	115	18	.46*
Supervisory ratings	P	111	16	.32
	Q	108	13	.44*
	K	107	18	.24
	F	105	20	.31
	M	116	19	.51*
236. Maintenance	G	97	15	.21
Mechanic II,	V	91	12	.28*
638.281	N	94	18	.04
N=84	S	104	17	.27*
Supervisory ratings	P	97	20	.29**
	Q	101	14	.26*
	K	94	16	−.05
	F	91	18	−.01
	M	101	20	.07
237. Manager, City	G	113	12	.68**
Circulation,	V	106	16	.66**
163.118	N	115	12	.88**
N=38	S	111	16	.26
Supervisory ratings	P	108	15	.44**
	Q	104	11	.60**
	K	104	17	.10
	F	104	21	.02
	M	104	26	.03
238. Manager, Industrial	G	122	15	.52**
Organization,	V	118	16	.39**
189.118	N	118	13	.27*
N=70	S	115	23	.46**
Grade-point averages	P	114	14	.16
	Q	110	14	.17
	K	113	14	.11
	F	102	15	−.13
	M	104	22	.12
239. Manager, Restaurant	G	100	17	.11
or Coffee Shop,	V	94	14	.16
187.168	N	103	18	.19
N=76	S	99	17	.08
Supervisory ratings	P	101	19	.02
239.—*Continued*				
	Q	107	16	.15
	K	106	14	.14
	F	91	20	.13
	M	105	21	.14
240. Manager, Retail	G	109	12	.56**
Food, 185.168	V	103	14	.52**
Validation sample	N	111	13	.35**
N=61	S	105	18	.24
Supervisory ratings	P	106	16	.39**
	Q	108	14	.38**
	K	108	16	.06
	F	98	18	.25
	M	113	17	.05
Cross Validation	G	106	16	.16
sample	V	97	14	.07
N=82	N	108	20	.16
Supervisory ratings	S	106	19	.14
	P	111	21	.29**
	Q	106	13	−.06
	K	103	19	.07
	F	95	19	.26*
	M	119	21	.09
Combined sample	G	107	15	....
N=143	V	100	14	....
	N	109	17	....
	S	105	18	....
	P	109	19	....
	Q	107	14	....
	K	105	18	....
	F	96	19	....
	M	116	20	....
241. Manager, Store I,	G	106	13	.13
185.168	V	101	10	.17
N=51	N	106	11	.22
Grade-point averages	S	109	20	−.08
	P	108	15	.35*
	Q	111	12	.19
	K	107	12	.07
	F	108	20	.13
	M	115	22	−.11

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
242. Manager, Theatre,	G	109	12	.31	244.—*Continued*				
187.168	V	109	14	.31		Q	108	16	.04
N=32	N	119	13	.20		K	107	13	.15
Supervisory ratings	S	100	16	.12		F	107	17	.26*
	P	103	16	.03		M	100	17	.11
	Q	105	9	−.12	245. Mathematician,	G	143	14	.29*
	K	117	15	.00	020.088	V	132	17	.37**
	F[26]	101	22	−.17	*N=52*	N	135	14	.12
	M[26]	104	19	−.11	Grade-point averages	S	132	14	.22
243. Manufacturers' Service Representative,	G	99	15	.24		P	124	20	.06
	V	97	16	.18		Q	133	20	.34*
638.281	N	93	13	.22		K	112	17	.17
Millwright, 638.281	S	103	20	.22		F	101	16	.07
Validation sample	P	90	16	.31*		M	108	16	.08
N=55	Q	91	12	.44**	246. Meat Cutter, 316.884	G	99	13	.28
Supervisory ratings	K	86	13	.11	*Validation sample*	V	97	12	.14
	F	87	18	.23	*N=50*	N	97	14	.14
	M	97	21	.26	Supervisory ratings	S	105	17	.45*
Cross Validation sample	G	96	14	.28		P	108	17	.06
	V	91	11	.18		Q	108	10	.15
N=40	N	92	16	.07		K	106	13	.10
Supervisory ratings	S	98	18	.35*		F	91	20	.24
	P	94	17	.26		M	106	20	.48*
	Q	98	12	.22	*Cross Validation sample I*	G	99	17	.48**
	K	86	17	.11		V	96	16	.48**
	F	82	20	.26	*N=49*	N	96	14	.37**
	M	91	22	.16	Supervisory ratings	S	106	19	.35**
Combined sample	G	98	15	....		P	107	22	.29*
N=95	V	95	14	....		Q	100	14	.19
	N	93	14	....		K	99	15	.15
	S	101	19	....		F	88	16	.42**
	P	91	16	....		M	112	21	.17
	Q	94	13	....	*Cross Validation sample II*	G	104	16	.24*
	K	86	14	....		V	98	14	.18
	F	85	19	....	*N=70*	N	103	16	.23
	M	94	21	....	Supervisory ratings	S	111	19	.27*
244. Marker II, 920.887	G	92	11	.14		P	113	18	.28*
N=60	V	90	12	.06		Q	112	15	.11
Supervisory ratings	N	95	14	.14		K	107	14	.03
	S	93	12	.07		F	95	17	.01
	P	103	13	.15		M	118	22	.10

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*Significant at the .05 level.

**Significant at the .01 level.

[26] N=29.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
246.—*Continued*				
Combined sample *N=169*	G	101	16	....
	V	97	14	....
	N	99	15	....
	S	108	19	....
	P	110	19	....
	Q	107	14	....
	K	104	14	....
	F	92	18	....
	M	113	22	....
247. Meat Packaging Occupations, Selected Casing Tier, 529.887 Packer, Sausage and Weiner, 920.887 Scaler, Sliced Bacon, 920.887 Tamale Packer, 920.887 *N=50* Supervisory ratings	G	83	14	.14
	V	85	14	.22
	N	81	17	.06
	S	90	14	.08
	P	89	22	.27*
	Q	88	17	.12
	K	94	15	.38**
	F	92	19	.52**
	M	100	17	.84**
248. Mechanical Technology-Technical Institute, 007. *N=55* Grade-point averages	G	126	11	.21
	V	109	10	.21
	N	125	13	.18
	S	129	14	.09
	P	124	17	.12
	Q	115	14	.15
	K	114	14	.08
	F	107	16	−.06
	M	118	19	.07
249. Medical Assistant, 079.368 *N=49* Supervisory ratings	G	107	14	.45**
	V	115	16	.34*
	N	104	16	.52**
	S	98	15	.27
	P	99	17	.24
	Q	112	18	.37*
	K	106	19	.23
	F	102	20	.21
	M	92	20	.22
250. Medical-Laboratory Assistant, 078.381 *N=81* Percentage grade on certification examination	G	119	12	.44**
	V	112	12	.24*
	N	121	14	.41**
	S	117	15	.35**
	P	133	17	.22*
	Q	133	16	.25*
	K	121	14	.21
	F	116	16	.07
	M	114	18	−.01
251. Medical Technologist, 078.381 *N=113* Supervisory ratings	G	126	13	.16
	V	127	16	.22*
	N	122	12	.14
	S	117	16	.02
	P	126	16	.12
	Q	130	18	.22*
	K	122	18	.12
	F	114	18	.03
	M	117	19	.08
252. Mender, 782.884 Burler, 689.684 *N=52* Supervisory ratings	G	88	09	.17
	V	91	11	.14
	N	87	13	.09
	S	87	12	.28*
	P	96	13	.15
	Q	91	14	−.07
	K	98	16	.21
	F	97	21	.42**
	M	104	20	.40**
253. Merchandise Packer, 920.887 *N=77* Supervisory ratings	G	88	14	.40**
	V	90	14	.31**
	N	88	16	.36**
	S	87	15	.34**
	P	90	14	.43**
	Q	99	13	.42**
	K	97	15	.33**
	F	93	18	.27*
	M	98	19	.48**
254. Metal-Chair Assembler, 739.884 *N=52* Production records	G	79	11	−.19
	V	80	09	−.08
	N	77	15	−.01

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
254.—*Continued*					258.—*Continued*				
	S	86	14	−.13		F	94	20	.26*
	P	89	16	−.11		M	105	24	.34**
	Q	88	13	−.12	259. Module Assembler II,	G	97	14	.13
	K	95	14	.36**	726.884	V	101	16	−.03
	F	107	17	.29*	*Validation sample*	N	96	12	.23
	M	110	17	.31*	*N=52*	S	94	16	.16
255. Metal Fabricator I,	G	96	13	.35*	Supervisory ratings	P	101	15	.00
619.380	V	92	12	.17		Q	107	14	.12
N=51	N	93	16	.42**		K	104	16	.12
Supervisory ratings	S	99	14	.30*		F	113	14	.14
	P	96	16	.47**		M	119	18	.42**
	Q	93	13	.42**	*Cross Validation*	G	92	13	.16
	K	90	17	.32*	*sample*	V	94	15	.24
	F	92	16	.36*	*N=50*	N	92	12	.17
	M	96	18	.44**	Supervisory ratings	S	89	18	.14
256. Metallurgical Tech-	G	120	11	.36**		P	93	15	.24
nology-Technical	V	108	09	.16		Q	99	12	.27
Institute Training,	N	121	11	.22		K	105	20	.10
011.	S	122	18	.28*		F	106	22	.37**
N=59	P	127	18	.26*		M	110	19	.35*
Grade-point averages	Q	117	14	.14	*Combined sample*	G	95	14	....
	K	114	16	.20	*N=102*	V	98	16	....
	F	116	19	.16		N	94	12	....
	M	122	18	.06		S	91	17	....
257. Micro-Logic	G	93	11	.03		P	97	16	....
Assembler, 726.884	V	95	11	−.07		Q	103	14	....
N=50	N	97	16	.10		K	104	18	....
Supervisory ratings	S	95	13	.02		F	110	18	....
	P	109	14	.12		M	114	19	....
	Q	116	13	.25	260. Molded-Goods	G	102	17	.02
	K	111	16	.12	Inspector-Trimmer,	V	102	18	−.05
	F	107	21	.34*	759.687	N	101	16	.18
	M	122	23	.25	*N=50*	S	102	20	.09
258. Model Maker I,	G	108	15	.34**	Supervisory ratings	P	108	20	−.04
693.381	V	104	12	.13		Q	106	16	.25
N=62	N	100	16	.21		K	107	17	.09
Instructors' ratings	S	118	19	.52**		F	108	17	.01
	P	109	17	.28*		M	115	19	.16
	Q	107	14	.00					
	K	103	17	.14					

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
261. Molder, Bench, 518.381 Molder, Floor, 518.381 *N=54* Supervisory ratings	G	102	11	.35*
	V	98	09	.30
	N	106	12	.38*
	S	101	14	.31
	P	108	14	.45*
	Q	101	11	.42*
	K	107	17	.24
	F	95	16	.24
	M	113	19	.06
262. Monotype-Keyboard Operator, 650.582 *N=52* Supervisory ratings	G	111	13	.31*
	V	109	14	.33*
	N	112	17	.25
	S	102	18	−.05
	P	104	17	−.13
	Q	121	15	.39**
	K	118	16	.13
	F	96	24	.10
	M	109	22	−.18
263. Mounter I, 726.887 *Validation sample* *N=208* [27] Production records and supervisory ratings	G	97	14	.03
	V	96	14	−.02
	N	98	15	.10
	S	100	16	−.02
	P	107	15	−.02
	Q	105	13	.10
	K	104	17	.34**
	F	110	17	.18
	M	107	20	.54**
Cross Validation sample *N=73* Production records	G	91	13	.03
	V	91	14	−.02
	N	88	18	.12
	S	95	16	.00
	P	93	16	.02
	Q	90	15	.10
	K	94	18	.04
	F	102	17	.26*
	M	101	18	.29*
Combined sample *N=281*	G	95	14	....
	V	95	14	....
	N	95	16	....
	S	99	16	....
	P	106	17	....
263.—*Continued*	Q	101	15	....
	K	104	18	....
	F	107	18	....
	M	106	20	....
264. Mounter, Color Film, 976.885 *N=50* Supervisory ratings	G	90	14	.42**
	V	91	14	.36*
	N	91	16	.38**
	S	90	17	.17
	P	93	18	.30*
	Q	101	18	.45**
	K	105	15	.23
	F	103	22	.43**
	M	104	18	.27
265. Multiple-Photographic-Printer Operator, 976.782 *N=50* Supervisory ratings	G	98	16	.26
	V	99	17	.31*
	N	96	19	.44**
	S	100	18	.01
	P	105	20	.23
	Q	105	16	.42**
	K	107	17	.34*
	F	109	20	.15
	M	110	19	.24
266. Multi-Moulding Unit Operator, 712.884 Heater Operator, 712.884 *N=66* Supervisory ratings	G	88	15	.08
	V	90	13	.22
	N	92	16	.09
	S	88	18	.01
	P	101	21	.42*
	Q	107	16	.15*
	K	99	19	.33*
	F	91	23	.35*
	M	105	23	.53*
267. Mushroom Inspector, 529.886 *N=74* Supervisory ratings	G	68	13	.27*
	V	75	11	.24*
	N	65	17	.38**
	S	72	14	.06
	P	69	21	.33**
	Q	80	15	.27*
	K	85	19	.24*
	F	84	21	.25*
	M	92	22	.37**

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*Significant at the .05 level.

**Significant at the .01 level.

[27] N=100 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
268. Napkin Packager, 920.885 *N=69* Supervisory ratings	G	91	14	.17	270. Nurse, General Duty, 075.378 *Validation sample* *N=80* Graduation from training program	G	116	12	.34*
	V	95	12	.03		V	118	13	.28*
	N	90	15	.25*		N	113	13	.35*
	S	99	20	.22		S	113	14	−.10
	P	109	25	.35**		P	116	16	.04
	Q	111	18	.40**		Q	115	14	.30
	K	105	16	.23		K	112	14	.29
	F	101	20	.47**		F	107	14	.16
	M	110	19	.46**		M	107	17	.20
269. Nurse Aid, 355.878 *Validation sample* *N=199* Supervisory ratings	G	89	14	.22**	*Cross Validation sample I* *N=94* Grade-point averages	G	116	13	.48**
	V	95	14	.15*		V	118	13	.39**
	N	85	16	.25**		N	111	13	.47**
	S	91	16	.11		S	112	16	.18
	P	91	18	.18*		P	125	17	.18
	Q	100	14	.14		Q	123	12	.26**
	K	100	17	.21**		K	119	15	.00
	F	86	18	.11		F	108	16	.12
	M	94	20	.10		M	112	20	.07
Cross Validation sample *N=155* [28] Supervisory ratings	G	87	16	.35**	*Cross Validation sample II* *N=100* Grade-point average	G	119	12	.43**
	V	92	15	.27**		V	117	10	.34**
	N	82	17	.37**		N	120	11	.43**
	S	89	17	.13		S	110	16	.23*
	P	90	18	.14		P	121	15	.26**
	Q	96	15	.35**		Q	123	14	.28**
	K	101	18	.26**		K	116	13	.18
	F	96	21	.04		F	114	17	.23**
	M	106	20	.13		M	107	17	.18
Combined sample *N=354*	G	88	15	....	*Combined sample* *N=274*	G	117	12	....
	V	94	14	....		V	117	12	....
	N	84	16	....		N	115	13	....
	S	90	18	....		S	112	16	....
	P	91	18	....		P	121	16	....
	Q	98	15	....		Q	121	12	....
	F	101	17	....		K	116	14	....
	K	101	17	....		F	110	16	....
	F	90	20	....		M	108	18	....
	M	99	21	....					

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*Significant at the .05 level.

**Significant at the .01 level.

[28] N = 115 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
271. Nurse, Licensed,	G	88	10	.25*	273.—*Continued*				
Practical, 079.378	V	94	12	.12	Grade-point averages	P	124	16	.20
Validation sample	N	87	11	.24	and supervisory	Q	124	14	.23*
N=94	S	86	16	.02	ratings	K	121	17	.01
Supervisory ratings	P	90	16	−.08		F	116	19	.36**
	Q	96	12	.10		M	112	20	.45**
	K	101	15	−.06	*Cross Validation*	G	120	12	.32**
	F	100	19	−.04	*sample*	V	123	10	.17
	M	103	18	.05	*N=75*	N	109	14	.28*
Cross Validation	G	102	12	.46**	Supervisory ratings	S	118	17	.14
sample	V	102	11	.54**		P	117	18	.24*
N=111	N	102	15	.29*		Q	123	16	.05
Instructor's ratings	S	104	16	.06		K	117	15	.41**
	P	118	17	.19*		F	107	20	.22
	Q	120	17	.32**		M	110	19	.35**
	K	114	16	.19*	*Combined sample*	G	121	11	....
	F	108	16	.03	*N=158*	V	123	12	....
	M	104	19	.11		N	110	13	....
Combined sample	G	96	13	....		S	121	15	....
N=205	V	98	12	....		P	121	17	....
	N	95	15	....		Q	123	15	....
	S	96	18	....		K	119	16	....
	P	105	22	....		F	112	20	....
	Q	109	19	....		M	111	19	....
	K	108	17	....	274. Occupational	G	104	13	.39**
	F	104	18	....	Therapy Aid,	V	105	14	.24
	M	104	18	....	079.368	N	98	13	.24
272. Nut Sorter, 521.887	G	75	11	−.09	*N=65*	S	109	16	.24
N=74	V	81	12	−.05	Grade-point averages	P	100	16	.28*
Supervisory ratings	N	69	15	−.02	and internship	Q	107	13	.37**
	S	82	12	−.16	ratings	K	107	16	.26*
	P	85	17	.13	(Correlations shown	F	97	19	.24
	Q	85	12	.13	are for grade-point	M	102	22	.36**
	K	97	18	.05	averages)				
	F	98	20	.01	275. Office-Machine	G	106	16	.26*
	M	101	19	.15	Serviceman,	V	105	17	.07
273. Occupational	G	122	11	.26*	633.281	N	101	16	.11
Therapist, 072.128	V	123	13	.25*	Adding-Machine	S	115	17	.47**
Validation sample	N	112	12	.24*	Serviceman,	P	104	16	.45**
N=83	S	124	13	.00	633.281	Q	97	16	.41**

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
275.—*Continued*				
Calculating-Machine	K	106	21	.53**
Serviceman,	F	105	19	.14
633.281	M	110	21	.52**
Cash-Register				
Serviceman,				
633.281				
Duplicating-Machine				
Serviceman,				
633.281				
Typewriter Service-				
man, 633.281				
Validation sample				
N=62				
Instructors' ratings				
Cross Validation	G	104	14	.21
sample	V	102	13	.18
N=55	N	97	14	.02
Supervisory ratings	S	109	20	.26
	P	100	17	.20
	Q	97	12	.27*
	K	100	15	.03
	F	104	17	.21
	M	109	20	−.05
Combined sample	G	105	15	....
N=117	V	103	15	....
	N	99	15	....
	S	112	18	....
	P	102	17	....
	Q	97	14	....
	K	103	18	....
	F	105	18	....
	M	109	21	....
276. Offset-Duplicating-	G	104	15	.18
Machine Operator,	V	100	13	.15
207.782	N	100	15	.22*
N=86	S	108	19	.11
Supervisory ratings	P	103	20	.14
	Q	104	14	.27*
	K	103	19	.14

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
276.—*Continued*	F	98	20	.24*
	M	104	21	.28**
277. Offset-Web-Press	G	100	13	.26
Man, 651.782	V	97	12	.26
N=53	N	96	14	.09
Supervisory ratings	S	106	17	.19
	P	97	15	.07
	Q	97	13	−.03
	K	99	14	.24
	F	88	20	.22
	M	100	24	.12
278. Oil-Burner-Instal-	G	104	14	.09
lation-And-Service-	V	103	15	.12
man, 862.281	N	99	14	.15
N=77	S	103	16	.00
Supervisory ratings	P	99	17	.18
	Q	99	14	.13
	K	100	16	.23*
	F	98	18	.27*
	M	108	19	.14
279. Onion Corer,	G	79	14	−.15
529.886	V	84	13	−.07
N=61	N	74	18	−.06
Supervisory ratings	S	90	16	−.05
	P	91	18	−.04
	Q	91	14	−.14
	K	92	16	.16
	F	101	19	.13
	M	98	16	.09
280. Operating Engineer	G	98	18	.22*
II, 859.883	V	98	16	.25*
N=92	N	91	17	.19
Supervisory ratings	S	104	19	.16
	P	89	20	.16
	Q	96	16	.19
	K	88	14	.17
	F	88	19	.13
	M	88	18	.10

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
281. Order Filler, 922.887	G	93	11	.16	283.—*Continued*				
Validation sample	V	95	12	−.08		Q	133	18	.03
N=51	N	91	13	.15		K	119	18	.02
Supervisory ratings	S	96	16	.18		F	99	18	−.03
	P	101	16	.25		M	124	21	−.10
	Q	104	12	.05	284. Packager, Machine,	G	96	12	.11
	K	103	18	.30*	920.885	V	91	12	.03
	F	102	21	.28*	*N=85*	N	98	14	.06
	M	96	20	.14**	Supervisory ratings	S	102	16	.20
Cross Validation	G	94	14	.33*		P	103	17	.09
sample	V	92	13	.30*		Q	106	13	.04
N=55	N	91	17	.39**		K	97	16	.20
Supervisory ratings	S	99	19	.27*		F	92	18	.10
	P	100	19	.55**		M	108	17	.24*
	Q	100	13	.64**	285. Packager, Solutions	G	91	16	.26
	K	101	17	.46**	and Syringes,	V	101	19	.12
	F	100	23	.29*	920.885	N	89	17	.21
	M	112	25	.37**	*N=32*	S	90	18	.22
Combined sample	G	93	13	....	Supervisory ratings	P	89	17	.27
N=106	V	94	13	....		Q	96	19	.32*
	N	91	15	....		K	104	18	.06
	S	97	18	....		F	96	18	.28
	P	101	18	....		M	101	19	−.10
	Q	102	12	....	286. Packaging-Machine	G	96	16	.34**
	K	102	18	....	Mechanic, 920.280	V	94	14	.24*
	F	101	22	....	*N=103*	N	92	17	.35**
	M	104	24	....	Supervisory ratings	S	99	19	.33**
282. Ornamental-Iron	G	104	16	.21		P	92	18	.41**
Worker, 809.381	V	96	16	.28*		Q	96	14	.28**
Structural-Steel	N	99	16	.18		K	99	17	.39**
Worker, 801.781	S	112	20	.06		F	100	20	.44**
N=77	P	107	18	.16		M	112	20	.49**
Supervisory ratings	Q	97	11	.41**	287. Packer, 920.887	G	89	14	.03
	K	95	19	−.21	*N=58*	V	91	14	.08
	F	105	20	.12	Supervisory ratings	N	85	15	.02
	M	114	10	.15		S	93	16	−.15
283. Osteopathic Physician,	G	124	12	.30**		P	95	16	.01
071.108	V	116	12	.18		Q	96	13	−.03
N=93	N	120	11	.28**		K	97	16	.23
Grade-point averages	S	119	17	.15		F	99	18	−.05
	P	131	17	.11		M	109	18	.23

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
288. Painter, 840.781	G	106	14	.39**	292.—*Continued*				
$N=202$	V	97	13	.28*		P	99	22	.33*
Instructor's ratings	N	103	15	.33**		Q	102	17	.37*
and school grades	S	114	19	.25*		K	98	22	.27
	P	107	15	.23*		F	86	22	.19
	Q	99	13	.27*		M	100	21	.34*
	K	99	16	.21	293. Paper Sorter and	G	92	13	.25
	F	98	18	.20	Counter, 649.687	V	90	11	.07
	M	103	18	.28*	$N=59$	N	95	16	.35**
289. Painter, Automobile,	G	91	16	.15	Supervisory ratings	S	94	16	.19
845.781	V	92	15	.28*		P	100	17	.36**
$N=55$	N	86	16	.04		Q	105	15	.42**
Supervisory ratings	S	97	19	.10		K	108	15	.28*
	P	89	15	.16		F	97	18	.34**
	Q	93	13	.24		M	102	21	.22
	K	98	15	.22	294. Parking Enforcement	G	98	14	.22
	F	87	16	.03	Officer, 375.588	V	102	14	.05
	M	96	18	.39**	$N=56$	N	98	14	.46**
290. Pairer, 684.687	G	94	13	.31*	Supervisory ratings	S	97	16	.08
$N=58$	V	96	14	.29*		P	104	16	.21
Production records	N	95	15	.39**		Q	117	13	.31*
	S	94	14	.12		K	101	13	−.03
	P	103	15	.34**		F	99	16	.03
	Q	107	14	.16		M	97	16	.12
	K	109	14	.13	295. Part Programer,	G	124	14	.27*
	F	102	18	.16	Numerical Control	V	110	15	.25
	M	98	22	.23	II, 007.187	N	122	16	.23
291. Pantographer,	G	80	12	.38**	$N=57$	S	122	14	.12
979.782	V	80	11	.13	Supervisory ratings	P	122	21	−.05
$N=50$	N	75	17	.41**		Q	120	18	.14
Supervisory ratings	S	91	16	.26		K	102	18	.16
	P	95	20	.42**		F	99	15	.06
	Q	92	15	.47**		M	104	22	.06
	K	91	20	.35*	296. Paster, 773.884	G	87	15	.35*
	F	96	19	.66**	Tile Placer,	V	90	15	.28*
	M	83	20	.39**	573.887	N	88	17	.40**
292. Pants Presser,	G	87	17	.27	Tile Sorter,	S	87	16	.23
363.782	V	87	15	.34**	573.687	P	87	18	.43**
$N=50$	N	88	20	.39**	$N=127$[29]	Q	94	16	.32*
Supervisory ratings	S	92	18	.08	Supervisory ratings				

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*Significant at the .05 level.

**Significant at the .01 level.

[29] N=50 for r's.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
296.—*Continued*					299. Peeling-and-Coring-	G	....	....	....
	K	97	18	.55**	Machine Operator,	V	....	....	....
	F	96	17	−.05	529.886	N	....	....	....
	M	99	19	.34*	*N=54*	S	83	19	.24
297. Patrolman,	G	112	10	.09	Supervisory ratings	P	78	22	.27*
375.268	V	110	10	−.04		Q	....	....	....
Validation sample	N	106	11	.12		K	88	20	.08
N=166	S	112	17	.15		F	89	20	.38**
Supervisory ratings	P	108	15	.20*		M	90	20	.26
	Q	106	11	.04	300. Pharmacist, 074.181	G	127	09	.22
	K	112	14	.06		V	115	10	.13
	F	100	18	.04	*N=64*	N	129	11	.16
	M	117	16	−.10	Grade-point averages	S	119	14	.03
Cross Validation	G	110	14	.39**		P	124	15	.18
sample	V	106	13	.46**		Q	127	16	.11
N=64	N	106	14	.24*		K	119	13	−.06
	S	109	21	.26*		F	110	17	−.13
	P	104	17	.26*		M	123	16	−.02
	Q	102	12	.39**	301. Photograph Finisher	G	92	18	.31*
	K	102	17	.32*	I, 976.886	V	98	17	.32*
	F	104	18	.22	*N=59*	N	92	20	.22
	M	111	19	.23	Supervisory ratings	S	95	18	.26*
Combined sample	G	111	11	....		P	103	20	.18
N=230	V	109	11	....		Q	116	19	.17
	N	106	12	....		K	103	17	.13
	S	111	18	....		F	106	22	.18
	P	106	16	....		M	100	24	.22
	Q	105	11	....	302. Photographer, Litho-	G	108	12	.29*
	K	109	16	....	graphic, 972.382	V	105	12	.06
	F	101	18	....	*N=55*	N	100	13	.31*
	M	115	17	....	Supervisory ratings	S	114	18	.23
298. Patternmaker,	G	110	15	.32*		P	105	17	.06
Metal, 600.280	V	103	14	.19		Q	102	12	.15
Patternmaker,	N	100	15	.36**		K	102	17	.27*
Wood, 661.281	S	121	21	.32**		F	95	21	.19
N=111 [30]	P	103	16	.38**		M	97	20	.26
Supervisory ratings	Q	101	14	.18	303. Photo-Offset Lithog-	G	107	13	.36**
	K	100	15	.13	raphy, 97-.	V	98	11	.30**
	F	105	20	.28	*N=105*	N	105	14	.37**
	M	116	19	−.06	Grade-point averages				

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*Significant at the .05 level.

**Significant at the .01 level.

[30] N=60 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
303.—*Continued*					304.—*Continued*				
	S	116	17	.23*		F	107	20	....
	P	114	18	.06		M	115	20	....
	Q	111	14	.20*	305. Pilot-Control	G	120	12	.44*
	K	102	16	.23*	Operator, 559.782	V	118	14	.46*
	F	99	21	.11	*N=42*	N	118	10	−.03
	M	108	21	.21*	Supervisory ratings	S	114	17	.42*
304. Physical Therapist,	G	118	12	.37**		P	108	17	.11
079.378	V	117	13	.43**		Q	107	17	.25
Validation sample	N	113	13	.12		K	105	16	−.02
N=122	S	118	16	.28**		F	96	19	.00
Grade-point averages	P	120	15	.10		M	98	20	.00
	Q	122	14	.18*	306. Pinsetter Mechanic,	G	103	14	.53**
	K	121	14	.04	Automatic, 829.281	V	100	13	.41**
	F	107	17	−.02	*N=83*	N	104	15	.39**
	M	123	19	.00	Classroom ratings	S	102	19	.29**
Cross Validation	G	114	14	.20	and field ratings	P	98	14	.32**
sample I	V	119	14	.17	(Correlations shown	Q	98	13	.39**
N=88	N	108	15	.20	are for classroom	K	94	17	.06
Supervisory ratings	S	108	15	.01	ratings)	F	100	17	.26*
	P	113	19	.18		M	100	20	.18
	Q	121	15	.02	307. Plasterer, 842.781	G	93	15	.53**
	K	118	16	−.11	*N=66*	V	89	13	.35**
	F	98	21	.13	Instructors' ratings	N	90	17	.42**
	M	106	17	.25*		S	103	18	.41**
Cross Validation	G	126	12	.26**		P	100	13	.28*
sample II	V	126	12	.32**		Q	95	10	.26*
N=102	N	122	13	.18		K	100	17	.09
Grade-point averages	S	117	14	.09		F	98	18	.21
	P	124	15	−.07		M	110	20	.22
	Q	130	14	.10	308. Plastic Trimmer,	G	89	15	.39*
	K	122	15	.07	712.887	V	90	13	.30*
	F	115	18	.15	Inserter, 712.884	N	94	19	.44*
	M	113	20	−.06	*N=100*	S	92	15	.20
Combined sample	G	120	13	....	Supervisory ratings	P	108	20	.20
N=312	V	120	14	....		Q	109	15	.33*
	N	115	15	....		K	105	16	.07
	S	115	16	....		F	100	21	.31*
	P	119	17	....		M	107	21	.13
	Q	125	15	....					
	K	120	15	....					

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
309. Plumber, 862.381	G	100	16	.37**	311.—*Continued*				
Pipe Fitter, 862.381	V	93	16	.30**		Q	82	15	.25*
Validation sample	N	97	18	.30**		K	88	22	.23*
N=322	S	110	19	.29**		F	95	19	.50**
Supervisory ratings	P	102	17	.16**		M	97	17	.56**
	Q	91	15	.30**	312. Power-Lawn-Mower	G	109	13	.39**
	K	94	16	.16**	Assembler, 706.884	V	103	12	.12
	F	100	18	.11*	*N=52*	N	108	12	.02
	M	107	18	.20**	Supervisory ratings	S	110	18	.37**
Cross Validation	G	97	16	.24*		P	105	17	.35*
sample	V	95	16	.18		Q	103	12	.38**
N=89	N	93	18	.25*		K	102	16	.06
Supervisory ratings	S	99	18	.04		F	99	18	.22
	P	86	17	.11		M	108	14	.23
	Q	84	16	.22*	313. Power-Plant	G	105	10	.27*
	K	84	20	.10	Operator I,	V	94	09	.01
	F	90	23	.04	952.782	N	105	13	.29*
	M	93	21	.05	*N=54*	S	114	17	.24
Combined sample	G	99	17	....	School grades	P	110	15	.16
N=411	V	93	16	....		Q	96	13	.30*
	N	96	18	....		K	99	17	.22
	S	107	19	....		F	100	18	.18
	P	99	18	....		M	95	17	.44**
	Q	90	15	....	314. Precision Lens	G	103	16	.27*
	K	92	18	....	Grinder, 675.380	V	102	13	.26
	F	98	20	....	*N=52*	N	98	17	.22
	M	104	20	....	Supervisory ratings	S	104	19	.34**
310. Polisher, 700.887	G	85	16	.15		P	95	18	.44**
N=57	V	88	13	−.03		Q	100	15	.27*
Supervisory ratings	N	85	14	.17		K	99	15	.11
	S	92	17	.24		F	91	19	.11
	P	93	18	.29*		M	104	20	.24
	Q	100	12	.42**	315. Presser, Hand,	G	89	17	.24
	K	90	18	.17	363.884	V	91	14	.14
	F	82	18	.02	Silk Finisher,	N	88	18	.40**
	M	88	20	−.17	363.781	S	90	19	.24
311. Poultry-Dressing	G	85	17	.24*	*N=93* [31]	P	99	22	.30*
Worker, 525.887	V	88	17	.22	Supervisory ratings	Q	103	18	.33*
N=72	N	80	19	.42**	and production	K	108	19	.21
Supervisory ratings	S	91	16	.03	records	F	95	22	.32*
	P	84	18	.09					

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*Significant at the .05 level.

**Significant at the .01 level.

[31] N=53 for r's.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—**Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
315.—*Continued*					318. Press Man Occupa-	G	97	15	.28**
(Correlations shown	M	109	22	.34*	tions, Selected	V	95	13	.09
are for production					Cylinder Press Man,	N	95	15	.29**
records)					651.782	S	96	19	.24*
316. Presser, Machine,	G	88	15	.20	Embossing-Press	P	95	15	.23*
363.782	V	90	15	.10	Operator, 659.782	Q	94	11	.10
N=51	N	82	16	.32*	Engraving-Press	K	94	17	.00
Supervisory ratings	S	91	19	.08	Operator, 651.782	F	94	19	−.10
	P	86	21	.13	Offset-Pressman,	M	102	19	−.10
	Q	90	13	.19	651.782				
	K	92	14	−.08	Overlay Cutter,				
	F	93	20	.31*	651.381				
	M	98	20	.31*	Platen-Press Man,				
317. Pressman, 559.885	G	103	15	.12	651.782				
Pressman, O-Rings,	V	94	14	.02	Web-Press Man,				
559.885	N	104	17	.07	651.782				
Validation sample	S	104	17	.16	*Validation sample*				
N=64	P	102	18	.29*	*N=112*				
Supervisory ratings	Q	100	13	.21	Supervisory ratings				
	K	98	15	.00	*Cross Validation*	G	106	17	.47**
	F	95	17	−.06	*sample I*	V	99	16	.51**
	M	109	18	.00	*N=48*	N	105	15	.47**
Cross Validation	G	99	16	.28	Supervisory ratings	S	114	19	.19
sample	V	99	19	.09		P	110	14	.46**
N=30	N	98	16	.33		Q	99	14	.62**
Supervisory ratings	S	100	17	.31		K	99	19	.42**
	P	90	12	.70**		F	102	17	.11
	Q	91	12	.42*		M	113	22	.34*
	K	95	14	.14	*Cross Validation*	G	104	16	.46**
	F	94	19	.43*	*sample II*	V	104	16	.38*
	M	106	16	.30	*N=32*	N	100	14	.46**
Combined sample	G	101	16	....	Supervisory ratings	S	107	17	.50**
N=94	V	96	16	....		P	99	14	.36*
	N	102	17	....		Q	93	10	.29
	S	103	17	....		K	90	16	.02
	P	98	17	....		F	85	20	.03
	Q	97	16	....		M	95	14	.25
	K	97	16	....					
	F	95	18	....					
	M	100	18	....					

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*Significant at the .05 level.
**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
318.—*Continued*	G	100	15	.36*
Cross Validation	V	101	18	.38**
sample III	N	99	13	.28
N=50	S	96	18	.35*
Supervisory ratings	P	98	13	.48**
	Q	100	14	.21
	K	103	16	.01
	F	104	19	.49**
	M	116	18	.08
Cross Validation	G	93	12	.44**
sample IV	V	92	12	.17
N=51	N	91	14	.43**
Supervisory ratings	S	93	15	.34*
	P	90	17	.53**
	Q	91	14	.41**
	K	91	16	.26
	F	91	18	.37**
	M	101	15	.24
Combined sample	G	99	15	....
N=293	V	97	15	....
	N	97	15	....
	S	100	20	....
	P	98	16	....
	Q	95	13	....
	K	95	18	....
	F	95	20	....
	M	105	20	....
319. Press Operator,	G	107	12	.23
573.380	V	97	14	.26
N=51	N	107	12	.33*
Supervisory ratings	S	112	16	−.08
	P	101	15	.18
	Q	101	11	.22
	K	98	19	.06
	F	98	20	.36*
	M	110	18	.43**
320. Printed-Napkin-	G	101	16	.36**
Machine Operator,	V	96	13	.34*
649.885	N	97	16	.21
N=55	S	110	19	.36**
Supervisory ratings	P	106	17	.21
320.—*Continued*				
	Q	101	14	.24
	K	102	16	.29*
	F	98	18	.30*
	M	107	17	.17
321. Printer-Slotter	G	92	16	.16
Operator, 651.782	V	89	13	−.02
N=70	N	90	18	.13
Supervisory ratings	S	101	20	.28*
	P	97	22	.28*
	Q	98	17	.25*
	K	104	20	.18
	F	96	20	.31**
	M	108	24	.14
322. Printing Curricula,	G	113	11	.16
65XX; 97XX	V	100	09	.18
N=70	N	114	12	.16
Grade-point averages	S	116	16	.17
	P	120	20	.02
	Q	116	11	.15
	K	111	20	.00
	F	109	20	.24*
	M	116	22	.13
323. Process Artist,	G	106	14	.18
972.281	V	102	15	.06
N=66	N	98	15	.13
Supervisory ratings	S	115	18	.16
	P	112	16	.14
	Q	105	14	.05
	K	106	18	.08
	F	99	18	.07
	M	100	19	.15
324. Process Inspector,	G	114	08	.24
736.381	V	108	11	−.17
N=57	N	112	10	.22
Supervisory ratings	S	113	17	.31*
	P	106	12	.20
	Q	99	13	.36**
	K	100	16	.05
	F	95	18	.37**
	M	100	18	.11

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
325. Processor, Solid	G	100	16	.48**	327.—*Continued*				
Propellant, 590.884	V	97	13	.49**		Q	106	11	−.10
N=59	N	97	17	.53**		K	97	17	.06
Supervisory ratings	S	102	19	.24		F	97	18	.30*
	P	97	16	.42**		M	107	21	.22
	Q	90	13	.47**	328. Programmer,	G	132	12	.36**
	K	93	17	.30*	Business, 020.188	V	125	13	.05
	F	95	17	.23	*Validation sample*	N	131	14	.40**
	M	99	19	.30*	*N=102*	S	122	16	.24*
326. Production-Machine	G	94	14	.28*	Supervisory ratings	P	120	16	.13
Operator, 609.885	V	92	15	.26		Q	128	16	.18
Validation sample	N	92	14	.17		K	117	14	.18
N=50	S	94	16	.22		F	109	19	.01
Supervisory ratings	P	91	17	.08		M	113	21	.28**
	Q	94	13	.16	*Cross Validation*	G	129	16	.37**
	K	94	18	.23	*sample I*	V	124	16	.31**
	F	90	20	.29*	*N=93*	N	125	16	.35**
	M	101	18	.33*		S	122	15	.25*
Cross Validation	G	95	17	.62**		P	118	16	.22*
sample	V	93	14	.40**		Q	126	18	.30**
N=82	N	....	....	....		K	119	16	.03
Instructors' ratings	S	102	19	.55**		F	107	18	−.01
	P	....	....	....		M	113	21	−.02
	Q	....	....	....	*Cross Validation*	G	128	13	.28*
	K	....	....	....	*sample II*	V	121	14	.13
	F	92	22	.40**	*N=62*	N	124	16	.25
	M	101	23	.23*		S	123	16	.34**
Combined sample	G	95	16	....		P	114	18	.12
N=132	V	93	14	....		Q	120	16	.22
	N	....	....	....		K	111	16	.02
	S	99	19	....		F	100	18	.32*
	P	....	....	....		M	100	24	.18
	Q	....	....	....	*Combined sample*	G	130	14	....
	K	....	....	....	*N=257*	V	124	14	....
	F	91	21	....		N	127	15	....
	M	101	22	....		S	122	16	....
327. Production Mechanic,	G	107	12	.19		P	118	16	....
Tin Cans,	V	98	10	.12		Q	125	17	....
619.380	N	104	11	.17		K	117	16	....
N=66	S	112	16	.20		F	106	19	....
Supervisory ratings	P	106	15	.10		M	109	22	....

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
329. Programmer, Detail, Graphic Arts, 219.388 *N=60* Instructors' ratings	G	117	17	.52**
	V	113	15	.28*
	N	114	18	.42**
	S	113	19	.40**
	P	112	19	.25
	Q	127	20	.20
	K	106	16	.27*
	F	100	20	.20
	M	111	18	.28*
330. Programmer, Engineering and Scientific, 020.188 *Validation sample* *N=72* Supervisory ratings	G	135	12	.27*
	V	128	14	.24*
	N	130	13	.26*
	S	124	14	.15
	P	122	20	.15
	Q	129	14	.18
	K	118	17	.21
	F	99	18	.17
	M	113	22	.26*
Cross Validation sample *N=59* Supervisory ratings	G	137	15	.48**
	V	128	16	.40**
	N	132	16	.40**
	S	125	16	.28*
	P	118	18	.17
	Q	129	20	.28*
	K	120	19	.20
	F	103	22	.21
	M	101	21	.07
Combined sample *N=117*	G	136	14	....
	V	128	15	....
	N	131	14	....
	S	124	15	....
	P	120	19	....
	Q	129	17	....
	K	119	18	....
	F	101	20	....
	M	108	22	....
331. Proof-Machine Operator, 217.388 *N=51* Production records	G	97	11	.18
	V	99	13	.22
	N	99	12	.29*
	S	95	15	.06
	P	112	16	.15
331.—*Continued*				
	Q	114	12	.26
	K	114	11	.13
	F	116	16	−.10
	M	114	22	.12
332. Proprietor-Manager, Retail Automotive, 185.168 *N=80* Supervisory ratings	G	101	15	.40**
	V	97	13	.33**
	N	103	15	.25*
	S	102	21	.32**
	P	93	20	.18
	Q	98	13	.37**
	K	98	16	.06
	F	92	17	.17
	M	95	18	.10
333. Psychiatric Aid, 355.878 *Validation sample* *N=241* Supervisory ratings	G	94	17	.31**
	V	97	16	.24**
	N	90	17	.29**
	S	95	19	.23**
	P	88	20	.23**
	Q	94	15	.24**
	K	96	18	.19**
	F	91	21	.19**
	M	90	21	.22**
Cross Validation sample I *N=110* Course grades	G	93	13	.38**
	V	95	12	.44**
	N	92	15	.27**
	S	97	18	.09
	P	100	19	.10
	Q	100	14	.08
	K	103	18	.00
	F	100	22	.19
	M	103	20	.08
Cross Validation sample II *N=55* Supervisory ratings	G	93	16	.35**
	V	96	16	.30*
	N	88	19	.32*
	S	92	19	.26
	P	88	19	.26
	Q	97	14	.31*
	K	102	19	.24
	F	94	24	.24
	M	101	24	.14

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
333.—*Continued*				
Combined sample	G	94	16	....
N = 406	V	96	15	....
	N	90	17	....
	S	95	19	....
	P	91	20	....
	Q	96	15	....
	K	99	19	....
	F	94	22	....
	M	95	22	....
334. Psychiatric	G	106	13	.43**
Technician,	V	105	14	.56**
079.368	N	102	13	.30**
N = 73	S	108	16	.08
Training course	P	112	16	.01
grades	Q	106	12	.22
	K	108	14	.24*
	F	104	20	−.13
	M	112	27	−.03
335. Punch-Press	G	86	13	.26
Operator I, 615.782	V	90	14	.35**
N = 52	N	87	15	.24
Supervisory ratings	S	85	15	.27*
	P	91	16	.50**
	Q	95	14	.31*
	K	95	17	.29*
	F	105	20	.28*
	M	109	16	.41**
336. Quality Control	G	111	15	.34**
Worker, 529.387	V	110	16	.21
N = 63	N	109	18	.40**
Supervisory ratings	S	109	20	.05
	P	121	21	.36**
	Q	124	18	.22
	K	115	15	.28*
	F	111	17	.12
	M	110	22	.12
337. Radiation Monitor,	G	115	15	.31*
199.187	V	108	15	.30
N = 55	N	114	14	.19
Supervisory ratings	S	113	18	.26
337.—*Continued*				
	P	114	20	.04
	Q	116	14	.25
	K	109	18	.03
	F	103	21	−.06
	M	108	22	.13
338. Radiographer,	G	111	15	.15
199.381	V	104	15	.09
Validation sample	N	111	14	.06
N = 48	S	112	18	−.02
Supervisory ratings	P	111	18	.03
	Q	118	16	.04
	K	110	17	.01
	F	99	21	.30*
	M	106	19	.19
Cross Validation	G	112	15	.43*
sample	V	102	13	.04
N = 30	N	111	16	.53**
Supervisory ratings	S	110	19	.42*
	P	110	17	.39*
	Q	113	15	.41*
	K	106	14	.20
	F	108	20	.21
	M	115	14	.14
Combined sample	G	112	15	....
N = 78	V	103	14	....
	N	111	15	....
	S	111	18	....
	P	111	17	....
	Q	116	16	....
	K	108	16	....
	F	102	21	....
	M	110	18	....
339. Radiologic Technologist, 078.368	G	105	14	.30*
Validation sample	V	110	15	.28*
N = 75	N	101	14	.43**
Supervisory ratings	S	97	17	−.04
	P	108	16	.10
	Q	117	14	.17
	K	112	18	.21

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
339.—Continued	F	108	18	.10
	M	105	19	.20
Cross Validation sample I *N=62* Supervisory ratings	G	104	16	.57**
	V	105	15	.50**
	N	97	17	.57**
	S	104	19	.39**
	P	103	20	.28*
	Q	108	19	.35*
	K	107	16	.31*
	F	99	19	.13
	M	107	21	.10
Cross Validation sample II *N=50* Supervisory ratings	G	110	12	.21
	V	107	12	−.03
	N	108	13	.18
	S	107	14	.06
	P	115	14	.02
	Q	117	12	.07
	K	113	14	.04
	F	109	17	−.28*
	M	117	17	−.12
Cross Validation sample III *N=40* Supervisory rating and course grades (Correlations shown are for supervisory ratings)	G	108	15	.47**
	V	104	14	.48**
	N	104	14	.48**
	S	113	17	.14
	P	112	16	.20
	Q	120	14	.41*
	K	114	14	.14
	F	108	17	.18
	M	101	17	.22
Combined sample *N=227*	G	106	15	....
	V	107	15	....
	N	102	15	....
	S	104	18	....
	P	109	17	....
	Q	115	16	....
	K	111	16	....
	F	106	18	....
	M	108	20	....
340. Radio-Receiver Assembler, 720.884 *N=59* Supervisory ratings	G	86	13	−.06
	V	90	14	−.16
	N	87	14	.19
	S	87	17	−.03
	P	94	18	.15
	Q	98	13	.12
	K	106	17	.20
	F	108	18	.32*
	M	116	17	.13
341. Radio Repairman, 720.281 Television Service-and-Repairman, 720.281 *Validation sample* *N=66* Supervisory ratings	G	104	17	.32**
	V	100	14	.21
	N	100	19	.30*
	S	109	18	.26*
	P	107	16	.28*
	Q	110	14	.16
	K	104	17	.11
	F	100	19	.15
	M	104	21	.05
Cross Validation sample *N=127* [32] School grades	G	114	14	.40**
	V	102	13	.09
	N	110	14	.41**
	S	123	18	.23
	P	110	13	−.02
	Q	103	13	.21
	K	100	16	.32*
	F	105	19	.21
	M	105	19	.04
Combined sample *N=193*	G	110	16	....
	V	102	14	....
	N	107	16	....
	S	118	19	....
	P	109	14	....
	Q	105	14	....
	K	101	16	....
	F	103	19	....
	M	104	20	....

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*Significant at the .05 level.

**Significant at the .01 level.

[32] N=62 for r's.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
342. Record-Press Tender,	G	93	16	.26
556.885	V	91	13	.11
N=50	N	94	19	.32*
Production records	S	98	20	.29*
	P	101	15	.36**
	Q	98	13	.19
	K	104	15	.15
	F	105	23	.28*
	M	118	18	.06
343. Refrigeration and	G	112	12	.53**
Heating Mechanic,	V	101	11	.46**
637.251	N	110	13	.51**
N=66	S	123	17	.15
Grade-point averages	P	114	15	.19
	Q	112	13	.38**
	K	106	17	.23
	F	104	18	.04
	M	115	18	.12
344. Reproduction	G	99	13	.41**
Specialist, 97XX	V	100	13	.24*
Validation sample	N	99	13	.23*
N=79	S	100	18	.33**
Supervisory ratings	P	106	13	.00
	Q	102	16	.22
	K	103	17	−.06
	F	93	21	.04
	M	99	21	.16
Cross Validation	G	96	10	.52**
sample	V	93	09	.34*
N=41	N	94	12	.31*
Scores on Ohio	S	103	17	.33*
Printing Test	P	97	12	.31*
	Q	94	10	.18
	K	94	12	.14
	F	95	20	.35*
	M	93	18	.30
Combined sample	G	98	12	....
N=120	V	97	12	....
	N	97	12	....
	S	101	18	....
	P	100	15	....
344.—*Continued*	Q	102	13	....
	K	100	16	....
	F	94	21	....
	M	97	20	....
345. Resistor Winder,	G	105	14	.31*
724.884	V	103	13	.18
N=50	N	104	17	.11
Supervisory ratings	S	107	19	.38*
	P	120	14	.12
	Q	117	16	−.05
	K	113	13	.08
	F	122	17	.35*
	M	102	19	.19
346. Rewinder Operator,	G	96	12	.26*
640.885	V	91	12	.08
N=87	N	98	14	.18
Supervisory ratings	S	98	16	.29**
	P	99	17	.29**
	Q	102	12	.02
	K	97	19	.25*
	F	88	24	.27*
	M	100	21	.34**
347. Rifter, 571.884	G	92	20	.31
N=38	V	96	21	.32
Supervisory ratings	N	88	21	.20
	S	97	17	.37*
	P	97	20	.38*
	Q	96	18	.31
	K	97	21	.46**
	F	89	19	.30
	M	89	22	.52**
348. Ring Maker III,	G	93	15	.52**
700.884	V	97	14	.37**
N=55	N	87	15	.51**
Supervisory ratings	S	98	21	.30*
	P	95	15	.52**
	Q	98	15	.59**
	K	101	14	.06
	F	109	18	.02
	M	102	18	.20

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
349. Rolling Mills Jobs, Guide Setter, 613.381 Manipulator, 613.782 Screw-Down Operator, 613.782 *N=70* Supervisory ratings	G	107	12	.08
	V	101	12	.00
	N	106	14	.18
	S	109	15	−.12
	P	111	15	.42#
	Q	106	15	.35#
	K	109	17	.24
	F	98	22	.11
	M	114	18	.37#
350. Room Clerk, 242.368 Hotel Clerk, 242.368 *N=54* Supervisory ratings	G	108	14	.17
	V	112	16	.03
	N	105	14	.20
	S	103	16	−.08
	P	108	16	−.15
	Q	113	13	.13
	K	112	17	−.29*
	F	108	21	−.21
	M	104	17	−.05
351. Rotary-Driller Helper, 930.884 *N=53* Instructors' ratings	G	101	15	.31*
	V	97	15	.24
	N	94	15	.18
	S	109	15	.39**
	P	102	19	.31*
	Q	99	14	.37**
	K	100	20	.13
	F	96	19	.45**
	M	116	24	.29*
352. Routeman, Retail Dairy Products, 292.358 *N=61* Supervisory ratings	G	104	13	.08
	V	103	16	.06
	N	107	15	.19
	S	98	16	.00
	P	94	14	.23
	Q	104	13	.13
	K	101	15	.34**
	F	92	18	.22
	M	103	17	.13
353. Routeman, Wholesale Dairy Products, 292.358 *N=110* Supervisory ratings	G	109	13	.21*
	V	104	15	.09
	N	113	13	.25**
	S	104	18	.14
	P	105	15	.18
353.—*Continued*	Q	106	12	.11
	K	108	15	.18
	F	96	17	.21*
	M	106	18	.25**
354. Sales Clerk, 290.478 *N=59* Supervisory ratings	G	88	14	.51**
	V	91	12	.45**
	N	92	15	.50**
	S	83	16	.24
	P	94	18	.11
	Q	99	13	.27*
	K	101	17	.35**
	F	94	18	.00
	M	98	17	.07
355. Salesman, Construction Machinery, 276.358 *N=113* Supervisory ratings	G	113	14	.32**
	V	109	14	.19*
	N	107	14	.29**
	S	111	17	.23*
	P	100	16	.15
	Q	104	15	.17
	K	102	16	.22*
	F	96	19	.18
	M	98	22	.15
356. Salesman, Real Estate, 250.358 *N=52* Supervisory ratings	G	113	13	.30*
	V	111	12	.11
	N	111	13	.29*
	S	103	19	.34**
	P	96	17	.43**
	Q	100	13	.22
	K	103	18	.06
	F	95	16	.18
	M	95	18	.08
357. Salesperson, General, 289.458 *N=96*[33] Supervisory ratings	G	100	17	.42**
	V	100	15	.38**
	N	102	17	.31*
	S	96	18	.35**
	P	97	17	.22
	Q	102	17	.19
	K	104	21	−.04
	F	97	22	.08
	M	96	21	−.05

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*Significant at the .05 level.

**Significant at the .01 level.

# Correlation more than twice the standard error.

[33] N=55 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
358. Scrapper, 794.887 *N*=*53* Supervisory ratings	G	99	15	.16
	V	95	16	.06
	N	97	16	.16
	S	105	15	.20
	P	105	14	.38**
	Q	92	13	.19
	K	95	18	.29*
	F	95	17	.38**
	M	103	22	.36**
359. Seamer, 787.782 *N*=*200*[34] Production records	G	86	14	.24
	V	89	14	.21
	N	88	15	.25
	S	88	16	.16
	P	98	16	.41**
	Q	97	14	.29*
	K	100	16	.15
	F	100	17	.04
	M	104	17	−.08
360. Seamless-Hosiery Knitter, 864.885 *N*=*54* Supervisory ratings	G	78	11	.30*
	V	81	12	.14
	N	75	15	.32*
	S	80	14	.12
	P	81	15	.11
	Q	86	10	.06
	K	90	15	.06
	F	94	19	.13
	M	80	16	.11
361. Seamstress, 782.884 Dry Cleaner, Hand, 362.884 Inspector, 369.687 Shirt Presser, 363.885 Wool Presser, 363.782 *N*=*33* Supervisory ratings	G	76	17	.17
	V	79	17	.10
	N	74	19	.21
	S	80	14	.08
	P	73	19	.16
	Q	74	19	.26
	K	69	22	.26
	F	86	20	.40*
	M	93	20	.49**
362. Seamstress, 785.381 *N*=*55* School grades	G	88	10	.21
	V	88	11	−.03
	N	88	14	.12
	S	96	13	.37**
362.—*Continued*	P	105	13	.43**
	Q	98	12	.03
	K	107	16	.06
	F	110	18	.26
	M	106	14	.28*
363. Second Helper-Open Hearth, 502.884 *N*=*55* Supervisory ratings	G	103	13	.27
	V	98	12	−.03
	N	102	13	.28
	S	104	16	.30
	P	105	11	.51*
	Q	102	13	.31
	K	105	16	.08
	F	96	18	−.11
	M	110	19	.20
364. Selector, 579.687 *N*=*51* Supervisory ratings	G	99	12	.17
	V	100	11	.09
	N	99	16	.26
	S	99	15	.18
	P	103	16	.14
	Q	104	13	.23
	K	103	13	−.07
	F	101	17	.08
	M	109	18	.07
365. Service Engineer, 626.251 *N*=*50* Supervisory ratings	G	109	12	.44**
	V	103	14	.36*
	N	104	14	.47**
	S	112	17	.23
	P	102	16	.38**
	Q	103	14	.32*
	K	101	14	.30*
	F	110	18	.22
	M	112	22	.29*
366. Set-Up Man, Sheet Metal, 616.380 *N*=*52* Supervisory ratings	G	97	17	.36**
	V	92	12	.19
	N	99	20	.43**
	S	103	20	.33*
	P	98	20	.28*
	Q	106	15	.37**
	K	92	15	.27

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*Significant at the .05 level.

**Significant at the .01 level.

[34] N=58 for r's.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
366.—*Continued*				
	F	85	19	.30*
	M	102	21	.46**
367. Sewing Machine	G	84	14	.45**
Operators, Selected	V	84	14	.47**
Sewing Machine	N	83	16	.55**
Operator, Lingerie,	S	92	16	.25
786.782	P	94	18	.46**
Sewing Machine	Q	88	16	.52**
Operator, Men's	K	88	19	.43**
Tailored Garments,	F	100	17	.22
786.782	M	92	22	.23
Sewing Machine				
Operator, Regular				
Equipment, 786.782				
Sewing Machine				
Operator, Style				
Garments, 786.782				
Sewing Machine				
Operator, Regular				
Equipment, 787.782				
Straw-Hat Machine				
Operator, 787.782				
Glove Sewer, 787.782				
Validation sample				
N = 133 [35]				
Supervisory ratings				
Cross-Validation	G	93	16	.50**
sample I	V	95	15	.54**
N = 156 [36]	N	93	19	.40*
Supervisory ratings	S	97	17	.42*
and production	P[37]	100	19	.57**
records	Q	99	17	.36*
	K	102	19	.34*
	F[37]	105	20	.52**
	M[37]	106	22	.05
Cross Validation	G	88	13	.26
sample II	V	86	12	.10
N = 58	N	88	16	.28*
Production records	S	89	15	.20
	P	94	18	.32*

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
367.—*Continued*				
	Q	93	14	.47**
	K	98	17	.21
	F	101	16	.10
	M	107	17	.17
Cross Validation	G	78	13	−.05
sample III	V	83	11	−.12
N = 75	N	77	16	.11
Production records	S	87	14	−.05
	P	38	20	.13
	Q	100	15	.02
	K	89	15	.24*
	F	85	23	.18
	M	82	18	.18
Combined sample	G	86	14	....
N = 422	V	88	14	....
[N = 417 For P, F, M]	N	86	17	....
	S	92	16	....
	P	95	19	....
	Q	95	16	....
	K	95	18	....
	F	99	19	....
	M	97	21	....
368. Sewing-Machine	G	88	16	.22*
Repairman,	V	86	12	.24*
639.281	N	84	19	.27*
N = 73	S	96	16	.10
Supervisory ratings	P	87	19	.16
	Q	88	15	.17
	K	86	18	.21
	F	96	18	.08
	M	97	21	.24*
369. Sheet-Metal Worker,	G	100	14	.46**
804.281	V	93	13	.33**
N = 79	N	95	16	.42**
School grades	S	110	16	.40**
	P	101	16	.34**
	Q	96	14	.38**
	K	99	19	.33**
	F	97	16	.28**
	M	116	19	.29*

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*Significant at the .05 level.

**Significant at the .01 level.

[35] N = 36 for r's.

[36] N = 36 for r's.

[37] N = 151.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
370. Shipfitter, 806.381 *N=62* Supervisory ratings	G	114	13	.26*
	V	110	14	.01
	N	107	14	.09
	S	114	18	.50**
	P	99	15	.17
	Q	108	12	−.07
	K	103	12	.00
	F	96	15	.15
	M	106	18	.13
371. Shrimp Picker, 529.886 *N=51* Average hourly earnings	G	93	20	.08
	V	96	17	.07
	N	87	19	.08
	S	94	20	.01
	P	98	24	.19
	Q	96	14	.15
	K	100	15	.37**
	F	95	18	.19
	M	98	21	.38**
372. Snipper-Belt Sorter, 529.687 *N=53* Supervisory ratings	G	111	19	.23
	V	108	19	.16
	N	103	16	.20
	S	110	21	.17
	P	111	20	.23
	Q	108	14	.13
	K	114	17	.27*
	F	108	21	.35**
	M	110	20	.28*
373. Sociologist, 054.088 *N=51* Grade-point averages	G	120	12	.40**
	V	124	13	.30*
	N	118	14	.14
	S	108	12	.11
	P	117	14	−.03
	Q	129	18	.21
	K	108	14	−.24
	F	98	20	−.37**
	M	99	20	−.41**
374. Solderer, Production Line, 814.884 *N=50* Supervisory ratings	G	100	14	.16
	V	94	12	.08
	N	104	15	.30*
	S	100	19	.08
	P	103	17	.30*
374.—*Continued*	Q	102	13	.26
	K	105	15	.18
	F	102	16	.28*
	M	112	19	.44**
375. Spinner, Ring Frame, 682.885 *N=60* Supervisory rating	G	84	13	.10
	V	85	13	.12
	N	81	13	.14
	S	88	15	.04
	P	88	19	.02
	Q	91	13	.05
	K	94	16	.40**
	F	91	16	.19
	M	99	18	.38**
376. Spooler Operator, Automatic, 689.886 *N=52* Supervisory ratings	G	79	15	.13
	V	82	12	−.06
	N	78	18	.16
	S	84	15	.18
	P	85	21	.17
	Q	94	16	.30*
	K	84	16	.24
	F	83	21	.11
	M	88	21	.28*
377. Spot-Welder Feeder, 819.886 *N=50* Production records	G	94	15	.21
	V	97	14	.09
	N	94	16	.23
	S	93	19	.28*
	P	105	19	.33*
	Q	101	14	.34*
	K	103	17	.12
	F	99	20	.40**
	M	93	20	.30*
378. Stacker, 774.884 *N=53* Supervisory ratings	G	87	15	.24
	V	90	13	.17
	N	84	19	.23
	S	92	16	−.04
	P	95	19	−.06
	Q	97	16	.00
	K	96	17	.06
	F	105	18	.00
	M	96	18	.23

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*Significant at the .05 level.
**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
379. Stationary Engineer,	G	105	18	.25*
950.782	V	101	16	.16
N=50	N	102	16	.38**
Supervisory ratings	S	109	17	.02
	P	93	14	−.02
	Q	97	14	.27
	K	95	19	.28*
	F	99	19	.08
	M	100	25	.19
380. Steam-Power-Plant	G	111	13	.35**
Operator, 952.782	V	107	14	.27**
N=120	N	106	14	.24**
Supervisory ratings	S	113	16	.23*
	P	100	18	.26**
	Q	104	15	.21*
	K	99	15	.24**
	F	85	20	.29**
	M	101	23	.24**
381. Stemmer, Hand,	G	84	13	.37**
521.887	V	89	12	.30*
N=50	N	85	17	.17
Production records	S	82	16	.31*
	P	93	16	.23
	Q	99	14	.32*
	K	96	15	.05
	F	94	20	.09
	M	77	16	.38**
382. Stemmer, Machine,	G	84	15	.10
521.885	V	85	12	−.04
N=71	N	87	19	.04
Supervisory ratings	S	85	15	.14
and production	P	96	16	.00
records	Q	96	16	.03
	K	98	16	.08
	F	91	18	.23*
	M	86	18	.22
383. Stenographer,	G	108	13	.29**
202.388	V	104	11	.35**
Typist, 203.588	N	108	15	.29**
Clerk-Typist, 209.388	S	109	16	.01
383.—*Continued*				
Validation sample	P	119	14	.23**
N=130	Q	114	13	.34**
Work sample	K	114	14	.20*
	F	103	20	.09
	M	103	22	.04
Cross Validation	G	106	10	.41**
sample I	V	101	09	.28*
N=60	N	109	12	.59**
Work sample	S	104	14	.01
	P	115	12	.27*
	Q	112	13	.54**
	K	108	14	.44**
	F	100	17	.38**
	M	95	17	.24
Cross Validation	G	105	09	−.45**
sample II	V	104	10	−.38**
N=50	N	103	11	−.50**
Work sample	S	106	13	−.14
	P	122	12	−.06
	Q	113	11	−.44**
	K	117	14	−.34*
	F	106	21	−.12
	M	105	19	−.27
Cross Validation	G	104	13	.41**
sample III	V	106	12	.50**
N=58	N	102	15	.35**
Work sample	S	108	15	.14
	P	117	14	.34**
	Q	113	12	.45**
	K	117	11	.31*
	F	114	21	.24
	M	109	17	.31*
Cross Validation	G	104	13	.17
sample IV	V	112	14	.24
N=51	N	104	14	.15
Supervisory ratings	S	98	18	.00
	P	111	18	.19
	Q	126	15	.17
	K	124	15	.17

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—**Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
383.—*Continued*					386. Stitcher, Standard	G	92	16	.15
	F	104	17	−.08	Machine, 690.782	V	93	13	.17
	M	110	19	−.08	$N=51$	N	89	17	.15
Cross Validation	G	99	14	.60**	Supervisory ratings	S	96	16	.05
sample V	V	98	12	.49**		P	105	18	.34*
$N=51$[38]	N	99	12	.54**		Q	100	14	.31*
Grade-point averages	S	104	18	.37**		K	98	15	.34*
	P	111	13	.35**		F	94	17	.28*
	Q	102	14	.46**		M	99	19	.23
	K	105	13	.25	387. Stock Chaser,	G	92	15	.35*
	F	101	20	.18	221.168	V	90	14	.18
	M	96	20	.29**	$N=51$	N	91	18	.39**
Combined sample	G	106	12	....	Supervisory ratings	S	96	20	.28*
$N=400$	V	105	12	....		P	93	18	.34*
	N	105	14	....		Q	88	14	.47**
	S	106	16	....		K	87	21	.29*
	P	117	14	....		F	85	22	.21
	Q	112	15	....		M	99	23	.16
	K	113	15	....	388. Stock Clerk, 223.387	G	84	12	.19
	F	105	20	....	$N=31$	V	88	13	−.10
	M	103	21	....	Supervisory ratings	N	87	12	.45*
384. Stereotyper, 975.782	G	108	18	.28*		S	86	16	.09
$N=50$	V	109	17	.11		P	88	15	.08
Supervisory ratings	N	103	15	.30*		Q	94	15	−.02
	S	107	20	.28*		K	91	17	−.04
	P	103	21	.21		F	87	17	.13
	Q	101	16	.27		M	90	15	−.01
	K	96	15	.22	389. Stocking Inspector I,	G	86	13	.08
	F	96	19	.29*	684.684	V	90	12	.19
	M	92	18	.26	$N=57$	N	86	14	−.06
385. Stillman, 542.280	G	98	16	.39**	Work sample	S	85	16	.11
$N=63$	V	96	16	.31*		P	95	18	.10
Supervisory ratings	N	97	15	.22		Q	101	13	.30*
	S	92	17	.43**		K	108	14	.14
	P	81	16	.30*		F	101	18	.00
	Q	91	13	.12		M	107	19	.14
	K	86	17	.30*	390. Stripper, 971.381	G	108	13	.40**
	F	79	16	.15	$N=53$	V	104	12	−.02
	M	86	16	.11	Supervisory ratings	N	100	12	.55**
						S	116	19	.33*
						P	108	14	.40**

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*Significant at the .05 level.

**Significant at the .01 level.

[38] Aptitude scores are 10th grade scores.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
390.—*Continued*					392. Structural-Steel	G	106	14	.54**
	Q	105	12	.14	Lay-Out Man,	V	97	14	.35*
	K	102	16	.02	809.281	N	109	14	.38**
	F	102	17	.15	*N = 50*	S	106	16	.43**
	M	102	18	.09	Instructors' ratings	P	108	16	.39**
391. Structural-Shipping	G	107	10	.40#		Q	104	13	.49**
Yard Jobs	V	100	10	.08		K	109	18	.19
Electric-Bridge-	N	107	12	.38#		F	97	18	.04
Crane Operator,	S	109	14	.35#		M	115	19	.26
921.883	P	108	13	.28#	393. Substation Operator,	G	112	14	.22*
Slipmaker, 619.387	Q	105	11	.37#	952.782	V	109	13	.01
Gag-Press	K	109	14	.34#	Switchboard	N	104	12	.23*
Straightener,	F	98	18	.21	Operator,	S	111	17	.22*
617.782	M	116	16	.37#	952.782	P	94	18	.13
Gasoline-Truck					Turbine Operator,	Q	100	14	.02
Operator, 922.883					952.782	K	100	17	.06
Crane Follower,					*N = 102*	F	84	18	.18
892.883					Supervisory ratings	M	96	20	.21*
Validation sample					394. Surgical Tech-	G	101	14	.37**
N = 82					nician, 079.378	V	104	14	.27
Supervisory ratings					*Validation sample*	N	96	16	.32*
Cross-Validation	G	106	11	.33#	*N = 50*	S	101	18	.33*
sample	V	98	11	.24	Supervisory ratings	P	110	15	.26
N = 86	N	107	12	.23		Q	114	16	.35*
Supervisory ratings	S	108	15	.16		K	109	16	.24
	P	112	16	.20		F	108	17	.23
	Q	108	13	.22		M	105	16	.30*
	K	107	17	.32#	*Cross Validation*	G	94	15	.31*
	F	101	17	−.04	*sample*	V	100	13	.29*
	M	112	19	.40#	*N = 52*	N	90	16	.15
Combined sample	G	106	10	.36#	Supervisory ratings	S	94	15	.32*
N = 168	V	99	10	.17		P	104	18	.14
	N	107	12	.30#		Q	103	14	.08
	S	108	14	.22#		K	108	17	.10
	P	110	15	.27#		F	105	20	.11
	Q	107	12	.28#		M	108	18	.04
	K	108	16	.33#	*Combined sample*	G	97	15	....
	F	100	17	.08	*N = 102*	V	102	14	....
	M	114	18	.38#		N	93	16	....
						S	97	17	....
						P	107	17	....

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*Significant at the .05 level.

**Significant at the .01 level.

# Correlation more than twice the standard error.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
394.—*Continued*				
	Q	108	16	....
	K	108	17	....
	F	106	19	....
	M	107	17	....
395. Surveyor, 018.188 *N=62* Supervisory ratings	G	119	16	.52**
	V	108	18	.49**
	N	118	17	.56**
	S	118	16	.17
	P	104	16	.21
	Q	108	15	.60**
	K	101	14	.26*
	F	93	18	.09
	M	95	18	.18
396. Survey Worker, 249.268 *N=134*[39] Supervisory ratings	G	119	15	.71**
	V	124	15	.57**
	N	112	15	.55**
	S	111	19	.45**
	P	104	14	.14
	Q	112	15	.26*
	K	107	20	.04
	F	....	....	....
	M	....	....	....
397. Systems Analyst, Business-Electronic-Data Processing, 012.168 *N=55* Supervisory ratings	G	133	13	.43**
	V	123	14	.47**
	N	132	13	.31*
	S	123	14	.03
	P	118	13	−.10
	Q	126	16	.32*
	K	118	14	.03
	F	107	19	−.13
	M	108	22	−.12
398. Table Worker, 920.887 *N=46* Supervisory ratings	G	87	11	−.19
	V	92	13	−.28
	N	87	13	−.14
	S	84	17	−.03
	P	100	19	−.14
	Q	101	13	−.03
	K	104	14	.11
	F	114	20	.16
	M	110	17	.32*
399. Tabulating-Machine Operator, 213.782 *N=203* Supervisory ratings	G	111	14	.34**
	V	109	15	.22**
	N	112	15	.36**
	S	106	18	.20**
	P	110	14	.10
	Q	116	15	.15*
	K	112	16	.08
	F	106	20	.10
	M	107	21	.10
400. Take-Off Man, 929.887 *N=52* Supervisory ratings	G	106	16	.35**
	V	99	15	.25
	N	104	15	.41**
	S	114	18	.20
	P	110	17	.32*
	Q	100	15	.39**
	K	101	13	.39**
	F	102	19	.04
	M	106	17	.65**
401. Tea-Bag Operator, 920.885 *N=56* Supervisory ratings	G	89	14	.28*
	V	92	15	.25
	N	84	14	.18
	S	92	17	.24
	P	97	18	.19
	Q	96	14	.15
	K	104	16	.02
	F	104	15	.21
	M	117	17	.09
402. Tea-Bag Packer, 920.887 *N=57* Supervisory ratings	G	88	11	.20
	V	90	14	.01
	N	85	13	.15
	S	94	17	.21
	P	95	16	.13
	Q	90	13	.19
	K	100	19	.30
	F	110	21	−.03
	M	104	16	.04
403. Teacher Aid, Elementary School, 099.308 *N=78* Supervisory ratings	G	82	14	.25*
	V	87	12	.12
	N	83	17	.33*
	S	87	16	.20

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*Significant at the .05 level.

**Significant at the .01 level.

[39] N=76 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
403.—*Continued*				
	P	94	20	.30**
	Q	106	14	.38**
	K	108	16	.30**
	F	94	20	.14
	M	108	18	.25*
404. Teacher Elementary School, 092.228 Teacher, Secondary School, 091.228 *Validation sample* *N=234* Grade-point averages	G	118	13	....
	V	122	15	....
	N	110	13	....
	S	111	17	....
	P	115	16	....
	Q	115	15	....
	K[40]	114	20	....
	F[41]	105	19	....
	M[41]	88	19	....
Cross Validation sample *N=263* Grade-point averages	G	111	13	....
	V	110	13	....
	N	110	13	....
	S	107	16	....
	P	111	16	....
	Q	117	14	....
	K	....	....	....
	F	....	....	....
	M	....	....	....
Combined sample *N=497*	G	114	13	....
	V	116	15	....
	N	110	13	....
	S	109	17	....
	P	113	16	....
	Q	116	15	....
	K	....	....	....
	F	....	....	....
	M	....	....	....
405. Teacher, Nursery School, 359.878 *N=83* Grade-point averages	G	104	11	.46**
	V	111	12	.41**
	N	98	13	.34**
	S	104	13	.26*
	P	112	14	.28**
	Q	111	14	.20
	K	111	16	.33**
405.—*Continued*	F[42]	111	17	.24*
	M[42]	87	19	.27*
406. Telephone Ad-Taker, 249.368 *N=60* Supervisory ratings	G	105	12	.02
	V	111	14	.02
	N	104	14	.00
	S	100	16	−.06
	P	99	18	−.06
	Q	120	19	−.05
	K	113	14	.24
	F	98	18	−.03
	M	98	20	.01
407. Telephone-Answering-Service Operator, 235.862 *N=56* Supervisory ratings	G	98	14	.23
	V	108	16	.09
	N	95	13	.20
	S	92	15	.16
	P	100	16	.02
	Q	110	17	.15
	K	107	15	.16
	F	100	17	.12
	M	98	19	.08
408. Teller, 212.368 *Validation sample* *N=50* Supervisory ratings	G	111	13	−.13
	V	110	12	.26
	N	110	14	−.08
	S	107	19	−.10
	P	114	16	.14
	Q	120	13	.11
	K	114	13	.09
	F	107	19	.44**
	M	101	17	.16
Cross Validation sample *N=50* Supervisory ratings	G	106	13	.13
	V	109	12	.05
	N	104	16	−.03
	S	103	19	.31*
	P	113	16	.35*
	Q	116	15	.21
	K	113	17	.18
	F	107	18	.24
	M	109	20	.00

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*Significant at the .05 level.

**Significant at the .01 level.

[40] N=229.

[41] N=30

[42] N=82.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
408.—*Continued*					412.—*Continued*				
Combined sample	G	109	13	....		P	115	15	.32*
N=100	V	110	13	....		Q	104	14	.45**
	N	107	15	....		K	104	14	.17
	S	105	19	....		F	115	17	.07
	P	114	16	....		M	118	17	.02
	Q	118	14	....	*Cross Validation*	G	114	15	.48**
	K	114	15	....	*sample I*	V	105	15	.23
	F	107	19	....	*N=59*	N	110	12	.40**
	M	105	19	....	Grade-point averages	S	120	18	.60**
409. Ticket Agent,	G	108	14	.42**		P	110	13	.41**
919.368	V	108	15	.48**		Q	106	14	.36**
N=55	N	107	12	.19		K	100	19	.11
Supervisory ratings	S	105	20	.28*		F	107	19	−.02
	P	109	18	.02		M	104	19	.04
	Q	115	12	.10	*Cross Validation*	G	106	14	.35**
	K	116	15	−.25	*sample II*	V	98	14	.09
	F	109	20	−.06	*N=124*	N	103	14	.37**
	M	125	21	.00	Supervisory ratings	S	114	16	.45**
410. Tire Builder,	G	102	17	.29*		P	109	14	.48**
Automobile, 750.884	V	97	16	.30*		Q	97	15	.28**
N=50	N	100	17	.12		K	104	17	.17
Supervisory ratings	S	103	21	.29*		F	100	18	.23*
	P	100	18	.28*		M	119	17	.30**
	Q	99	16	.06	*Combined sample*	G	109	15	....
	K	104	18	.02	*N=246*	V	100	15	....
	F	93	18	.26		N	105	13	....
	M	110	18	.15		S	119	19	....
411. Tomato Peeler,	G	55	09	.10		P	111	14	....
529.887	V	60	08	.06		Q	101	15	....
N=61	N	48	14	.22		K	104	17	....
Supervisory ratings	S	71	15	.14		F	106	19	....
	P	55	21	.29*		M	115	19	....
	Q	56	15	.07	413. Tractor-Trailer-	G	100	13	.48**
	K	55	27	.45**	Truck Driver,	V	97	13	.37**
	F	95	22	.61**	904.883	N	97	14	.52**
	M	94	23	.57**	Trailer-Tank-	S	98	14	.32*
412. Tool-and-Die Maker,	G	111	14	.73**	Truck Driver,	P	86	15	.21
601.280	V	100	14	.50**	903.883	Q	93	10	.40**
Validation sample	N	105	13	.58**					
N=63	S	125	19	.54**					
Supervisory ratings									

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
413.—*Continued*				
Validation sample	K	96	19	.25
$N=50$	F	99	15	.26
Supervisors ratings	M	101	23	.12
Cross Validation	G	98	13	.30**
sample	V	93	11	.24*
$N=92$	N	98	15	.30**
Instructors' ratings	S	100	16	.24*
	P	99	16	.18
	Q	93	11	.11
	K	101	20	.26*
	F	100	21	.44**
	M	115	23	.21*
Combined sample	G	99	13	....
$N=142$	V	94	12	....
	N	98	15	....
	S	99	16	....
	P	94	17	....
	Q	93	11	....
	K	100	20	....
	F	100	19	....
	M	110	24	....
414. Traffic Device	G	90	14	.11
Maintainer,	V	91	10	.01
869.884	N	87	16	.16
$N=67$	S	96	16	.20
Supervisory ratings	P	87	20	.22
	Q	88	11	.16
	K	96	18	.22
	F	88	17	.14
	M	92	20	.16
415. Trailer Assembler,	G	89	14	.31*
806.781	V	85	14	.23
$N=50$	N	88	17	.19
Supervisory ratings	S	94	16	.28*
	P	85	19	.33*
	Q	82	13	.27
	K	77	22	.04
	F	89	22	−.17
	M	111	22	−.05
416. Transfer Knitter,	G	85	13	.26
684.782	V	85	13	.07
$N=52$	N	82	16	.26
Supervisory ratings	S	92	18	.31*
	P	98	13	.06
	Q	89	13	.10
	K	96	17	.26
	F	104	17	.45**
	M	98	18	.39**
417. Transferrer I,	G	107	13	.19
972.381	V	105	12	.08
$N=53$	N	102	14	.07
Supervisory ratings	S	108	18	.31*
	P	102	15	.00
	Q	101	12	−.02
	K	101	14	−.21
	F	98	19	−.32*
	M	103	18	−.26
418. Transportation	G	101	19	.25
Agent, 912.368	V	99	15	.32*
$N=50$	N	99	18	.31*
Supervisory rating	S	104	18	.12
	P	97	22	.14
	Q	102	16	.19
	K	100	16	.17
	F	94	25	.25
	M	102	26	.20
419. Tricot-Knitting	G	81	15	.36**
Machine Operator,	V	80	15	.35*
685.885	N	80	18	.22
$N=51$	S	86	18	.27
Supervisory ratings	P	84	18	.36**
	Q	80	16	.35*
	K	80	16	.36**
	F	90	16	.25
	M	92	18	.14
420. Turret-Lathe Set-up	G	98	16	.19
Operator, Tool,	V	94	14	.00
604.280	N	97	17	.08
$N=36$	S	103	19	.30
Supervisory rating				

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
	P	96	18	.37
	Q	87	13	−.09
	K	88	19	.28
	F	93	16	.12
	M	104	20	.09
421. Twister Tender, 681.885 *N=61* Supervisory ratings	G	93	16	.19
	V	92	14	.04
	N	96	16	.20
	S	96	18	.21
	P	110	16	.19
	Q	113	14	.24
	K	113	16	.20
	F	108	22	.07
	M	108	22	.00
422. Typesetter-Perforator Operator, 208.588 *N=183* Supervisory ratings	G	110	15	.30**
	V	113	14	.21*
	N	106	16	.31**
	S	104	17	.11
	P	107	18	.13
	Q	120	17	.25**
	K	114	16	.17*
	F	102	18	.05
	M	101	20	.05
423. Underwriter, 169.188 *N=81* Supervisory ratings	G	128	11	.16
	V	129	16	.12
	N	125	12	.24*
	S	115	19	−.07
	P	109	14	−.14
	Q	121	16	.25*
	K	111	18	.18
	F	102	17	−.22*
	M	108	18	.05
424. Upholsterer II, 780.884 *Validation sample* *N=49* Supervisory ratings	G	88	15	.24
	V	86	14	−.04
	N	85	19	.15
	S	97	17	.43**
	P	93	18	.25
	Q	92	16	.30*
	K	97	19	.08
	F	107	20	.18
	M	105	19	.32*
424.—*Continued*				
Cross Validation sample *N=41* Supervisory ratings and production records (Correlations shown are for supervisory ratings)	G	86	13	.04
	V	82	11	.13
	N	83	16	.06
	S	90	14	−.09
	P	89	16	−.12
	Q	87	11	−.18
	K	91	19	.31*
	F	90	16	.01
	M	104	17	.35*
Combined sample *N=90*	G	87	14	....
	V	84	13	....
	N	84	18	....
	S	94	16	....
	P	91	18	....
	Q	90	14	....
	K	95	19	....
	F	100	20	....
	M	105	18	....
425. Vending Machine Repairman, 639.381 *N=49* Supervisory ratings	G	101	15	−.03
	V	98	13	−.05
	N	96	18	−.02
	S	111	15	−.14
	P	100	14	.13
	Q	100	13	.26
	K	98	18	.06
	F	97	19	.23
	M	111	21	.18
426. Venetian-Blind Assembler, 739.884 *N=66* Supervisory ratings	G	94	13	−.04
	V	94	15	−.03
	N	97	15	.15
	S	95	16	.01
	P	103	19	.17
	Q	106	16	.18
	K	105	13	.09
	F	105	19	.21
	M	103	19	.13
427. Veterinarian, 073.108 *N=72* [43] School grades	G	125	10	.30
	V	122	14	.33
	N	120	10	.14

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*Significant at the .05 level.

**Significant at the .01 level.

[43] N=33 for r's.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
427.—*Continued*	S	120	16	.16
	P	113	15	−.02
	Q	114	14	.27
	K	111	17	.15
	F	104	16	.05
	M	110	19	.00
428. Waitress, 311.878 *N = 60* Supervisory ratings	G	94	17	.08
	V	95	12	−.07
	N	93	16	.27*
	S	97	21	.05
	P	99	21	.03
	Q	102	15	.07
	K	102	16	.03
	F	102	16	.20
	M	108	20	.18
429. Waitress II, 311.878 *N = 52* Supervisory ratings	G	80	14	.21
	V	87	14	.22
	N	78	16	.10
	S	85	14	.15
	P	84	15	.25
	Q	92	14	.15
	K	92	16	.29*
	F	82	15	.21
	M	90	17	.21
430. Ward Clerk, 219.388 *N = 50* Supervisory ratings	G	101	14	.14
	V	107	14	.13
	N	97	14	.11
	S	98	19	.11
	P	97	19	.16
	Q	108	14	−.15
	K	105	20	.10
	F	95	19	.21
	M	99	26	.02
431. Watch-Making Jobs, Balance Wheel Assembly Department Balance Truer II, 715.885	G	94	18	.24
	V	92	15	.22
	N	89	17	.20
	S	104	17	.19
	P	103	19	.34**
	Q	100	16	.30*
Balance-Wheel-and-Impulse-Pin Subassembler, 715.887 Wheel Inspector, 715.387 Hairspring Solderer, 715.887 Hairspring Vibrator, 715.381 Inspector, Balance Wheel and Impulse Pin, 715.687 Put-in-Beat Adjuster, 715.884 *N = 59* Supervisory ratings	K	101	17	.28*
	F	105	21	.64**
	M	101	18	.36**
432. Watch Making Jobs, Finishing Department, Caser, 715.884 Dialer, 715.884 Final Inspector, Movement Assembly, 715.687 Hands Assembler, 715.884 Inspector, Casing, 715.687 Liner-and-Gasket Inserter, 715.887 Lint Remover, 715.887 Sweep-Spring Attacher, 715.887 *N = 60* Supervisory ratings	G	98	17	.37**
	V	97	16	.20
	N	92	16	.40**
	S	105	22	.38**
	P	106	20	.43**
	Q	103	16	.46**
	K	105	14	.55**
	F	109	17	.56**
	M	106	18	.50**
433. Watch Making Jobs, Movement Assembly Department	G	96	13	.29*
	V	96	13	.24
	N	91	13	.34**

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*Significant at the .05 level.

**Significant at the .01 level.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
433.—*Continued*					434.—*Continued*				
Balancer Assembler,	S	103	16	.11	Adjuster, 715.887				
715.884	P	104	14	.54**	Staker, 715.884				
Endshake Adjuster,	Q	103	12	.35**	Straightener, 709.884				
715.885	K	103	14	.25*	Tray Leader, 715.887				
Banking Adjuster,	F	104	17	.48**	$N=56$				
715.781	M	101	16	.39**	Supervisory ratings				
Hairspring Inspector					435. Water Filterer II,	G	93	16	.44**
I, 715.381					954.782	V	94	15	.30*
Hairspring Pinner,					$N=51$	N			
715.887					Supervisory ratings	S	90	19	.41**
Mechanism						P	76	16	.44**
Assembler,						Q	86	11	.46**
715.884						K	80	22	.28*
Oiler, 715.884						F	78	22	.30*
Repairman, 715.281						M	76	20	.28*
Timing-Machine					436. Water-Treatment-	G	109	14	.45**
Operator, 715.585					Plant Operator,	V	102	13	.40**
Train Inspector,					954.782	N	110	15	.28*
715.381					$N=61$	S	104	18	.24
$N=63$					State Board License	P	95	17	.08
Supervisory ratings					Examination grades	Q	98	15	.22
434. Watch Making Jobs,	G	96	16	.49**		K	97	15	−.21
Sub-Assembly-Other	V	94	16	.31*		F	93	20	−.08
Department	N	89	19	.46**		M	90	20	−.26*
Barrel-Arbor Assem-bler, 715.887	S	102	18	.50**	437. Weaver, 683.782	G	100	15	.23
	P	102	18	.42**	*Validation sample*	V	96	16	.02
Burrer, 715.884	Q	98	14	.41**	$N=57$	N	98	16	.14
Burrer, Machine,	K	99	15	.48**	Supervisory ratings	S	104	17	.46**
603.885	F	100	16	.32*		P	99	16	.46**
Lancing Gager,	M	97	17	.50**		Q	98	14	.08
715.687						K	97	18	.03
Main-Arbor-and-						F	102	20	.35**
Hook Assembler,						M	110	20	.35**
715.887					*Cross Validation*	G	89	12	.15
Pinion Reamer,					*sample*	V	90	11	−.09
715.887					$N=37$	N	87	13	.11
Reamer, 606.885					Supervisory ratings	S	89	15	.35*
Retaining-Spring						P	85	17	.31
Attacher, 715.887						Q	87	13	.40*
Rocking-Bar						K	94	20	.23

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*Significant at the .05 level.

**Significant at the .01 level.

***Table 9–3. GATB Data on Aptitudes for Specific Occupations*—Continued.**

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
437.—*Continued*					440.—*Continued*				
	F	97	19	.30	*Cross Validation*	G	93	15	.26
	M	98	19	.41*	*sample*	V	89	14	.16
Combined sample	G	96	14	....	*N = 52* [45]	N	91	15	.25
N = 94	V	93	14	....	Instructors' ratings	S	102	16	.31*
Supervisory ratings	N	94	16	....		P	101	15	.54**
	S	98	18	....		Q	99	12	.11
	P	93	18	....		K	91	15	.11
	Q	94	15	....		F	89	16	.35*
	K	96	19	....		M	94	17	.19
	F	100	20	....	*Combined sample*	G	94	15	....
	M	105	20	....	*N = 136*	V	88	15	....
438. Weighing-Station	G	93	14	.52**		N	93	16	....
Operator, 224.487	V	91	14	.42**		S	104	16	....
N = 98	N	97	14	.51**		P	99	16	....
Supervisory ratings	S	91	18	.30**		Q	92	15	....
	P	88	15	.36**		K	94	15	....
	Q	87	13	.34**		F	96	18	....
	K	91	20	.37**		M	98	18	....
	F	86	21	.22*	441. Welder, Gas	G	89	16	.37**
	M	97	20	.33**	Shielded Arc,	V	89	15	.09
439. Welder, Arc, 810.884	G	102	16	.02	810.884	N	84	16	.40**
N = 49	V	96	12	.09	*N = 50*	S	93	18	.46**
Welding test results	N	97	16	−.03	Supervisory ratings	P	85	15	.31*
	S	109	17	.10		Q	88	11	.19
	P	98	17	.02		K	89	14	.26
	Q	97	11	−.27		F	92	16	.11
	K	94	15	.12		M	85	18	.04
	F	98	15	.03	442. Welder, Production	G	85	19	.33**
	M	100	19	.17	Line, 812.884	V	86	15	.24*
440. Welder, Combina-	G	95	16	.38**	*N = 116*	N	82	21	.31**
tion, 812.884	V	88	15	.23	Supervisory ratings	S	92	21	.29**
Validation sample	N	94	17	.29*		P	90	26	.32**
N = 84 [44]	S	105	16	.64**		Q	98	18	.31**
Instructors' ratings	P	97	17	.46**		K	87	19	.28**
	Q	88	15	.44**		F	83	22	.34**
	K	95	19	.21		M	89	21	.40**
	F	100	18	.58**					
	M	100	18	.72**					

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*Significant at the .05 level.

**Significant at the .01 level.

[44] N = 51 for r's.

[45] N varies for each aptitude.

Table 9–3. GATB Data on Aptitudes for Specific Occupations—Continued.

Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r	Occupation, Number of Cases and Criterion	Aptitudes	M	SD	r
443. Wire Drawer, 614.782	G	96	14	.29*	445. Wrapper Layer,	G	88	13	.28
$N=50$	V	98	16	.34*	529.885	V	86	11	−.03
Supervisory ratings	N	96	15	.30*	Wrapper-Layer,	N	93	16	.31*
	S	95	15	.15	Examiner, Soft	S	90	16	.29*
	P	100	14	.28*	Work, 529.885	P	102	15	.28
	Q	104	13	.50**	$N=46$	Q	99	15	−.11
	K	99	16	.31*	Supervisory ratings	K	102	15	.11
	F	103	20	.15		F	107	18	.29*
	M	91	20	.32*		M	91	17	.23
444. Woodworking-	G	93	17	.27*	446. Yarn Winder,	G	80	14	.18
Machine Operator,	V	88	14	.22	681.885	V	85	11	−.05
669.782	N	95	17	.20	$N=64$	N	77	18	.27*
$N=59$	S	93	22	.33*	Supervisory ratings	S	85	14	.13
Supervisory ratings	P	90	18	.20		P	86	17	.06
	Q	93	12	.19		Q	95	14	.21
	K	89	19	.14		K	97	17	.30**
	F	92	11	.39**		F	91	19	.19
	M	97	23	−.04		M	107	23	.24*

*Significant at the .05 level.

**Significant at the .01 level.

10. Development of Occupation Aptitude Pattern Structure

The occupational norms used by the counselor in interpreting the scores made on the GATB are in the 1970 edition of Section II of the *Manual for the GATB.* These norms are shown in terms of an Occupational Aptitude Pattern structure consisting of a series of Occupational Aptitude Patterns. Each Occupational Aptitude Pattern consists of the most significant aptitudes and the cutting scores on these aptitudes established as minimum scores for the family or group of occupations having similar aptitude requirements. The multiple cutoff method is employed in using these norms. In addition to the theoretical considerations in favor of the multiple cutting score approach outlined in the preceding pages, a very practical advantage of using multiple cutting score norms for a specific occupation is the relative ease with which such norms can be applied to an applicant's aptitude scores. There is no necessity for substituting scores in an involved multiple regression equation; all that is required is to note whether or not the applicant's scores on the aptitudes included in the norms meet the minimum scores established for the occupation in question. If ease of applying norms is of some practical importance in the selection process in which a number of applicants are being considered for employment on a particular job, it is of crucial importance in the counseling process where a large number of occupations are being considered for one person. The multiple cutting score method for determining occupational qualification or nonqualification on the basis of test performance is readily adaptable to the vocational counseling situation; but at the same time, counseling only on the basis of norms established for single occupations would be both impractical and inefficient. The reasons for this are as follows:

1. Although it is true that use of multiple cutting scores is much less time consuming than use of multiple regression equations, the mechanics of using multiple cutting scores for determining separately an individual's qualification or nonqualification for a large number of specific occupations would be an inefficient and time-consuming process.

2. Much of the value of counseling would be lost if recommendations were made only for individual occupations rather than for broad groups of occupations.

A preliminary review and analysis of data available for specific occupations (see Chapter 9 of this Section) indicated that it would be possible to (1) group occupations into a relatively small number of families for which aptitudinal requirements were very nearly the same, and (2) establish aptitude norms in terms of the three most significant aptitudes for each family, which might differ somewhat from the specific norms established for the individual occupations grouped in the family but would still meet the requirement of significant relationship for these occupations. This accomplishes the dual purpose of making maximum use of the available data and grouping occupations into a relatively small number of families. The procedures used for grouping occupations into families and establishing Occupational Aptitude Pattern norms for such families are described in the following sections.

PRELIMINARY GROUPING OF OCCUPATIONS INTO FAMILIES

The first step was to establish a number of groups of occupations for which aptitude requirements were substantially the same. This was done by placing each occupation for which norms had been developed in one or more occupational groups as follows:

1. An occupation which had three aptitudes in its specific norms was grouped with other occupations that had norms with the same three aptitudes in common.

2. An occupation with specific norms which included four or more aptitudes was placed in

each group of occupations with specific norms which had any three of these aptitudes in common.

3. An occupation which had only two aptitudes in its specific norms was experimentally placed in each of the above groups of occupations with norms that included both of these aptitudes.

ESTABLISHING OAP NORMS

The trial OAP for each occupational group consisted of a combination of three aptitudes derived as described above. Experimental critical or cutting scores were set up as follows:

As a first approximation, cutting scores for each aptitude in a trial OAP were set at the median (rounded to an adjacent 5-point score level) of the cutting scores in the specific norms for the occupations grouped under the OAP. (Subsequently slight adjustments in these scores were made to obtain significant correlation for the maximum number of occupations in the group.) Cutting scores were set only at 5-point score levels so that undue advantage would not be taken of chance fluctuations.

The trial OAP norms set up for each occupational group were applied to the sample for each occupation in the group. The following information was obtained for each sample:

1. The correlation coefficient between the trial OAP norms and the criterion.
2. The significance of the correlation coefficient.

OAP norms were established when each of two or more occupations in the group yielded a significant correlation coefficient between the trial OAP norms and the criterion for the specific occupational sample. This correlation was not always as high as the correlation of the specific norms for the occupation, because the OAP norms were based on a grouping of occupations. Occupations originally included in the group which did not meet this condition were dropped from this group but were considered for other trial OAP's. Occupations which qualified for two or more groups on the basis of the above standard were placed in that group for which the trial OAP norms resulted in the highest correlation.

CONTINUING EXPANSION OF OCCUPATIONAL COVERAGE FROM NEW DATA

As research progresses, the data for each new test development study are analyzed to determine the applicability of existing OAP norms for the specific occupation studied. This analysis is made after the norms for the specific occupation have been determined according to the procedures described in Chapter 8 of this Section. The steps in the selection of the appropriate OAP are as follows:

1. Selection of OAP norms to be considered: an occupation is considered for inclusion in only those existing OAP's with norms similar to the specific norms for the occupation. If the specific norms include three aptitudes, the OAP norms must include the same three aptitudes. If the specific norms include four aptitudes, the OAP norms must include three of the four aptitudes. If the specific norms include only two aptitudes, the OAP norms must include both of these aptitudes. In each instance the respective aptitude cutting scores of the OAP norms must be within 10 points of the cutting scores of the specific norms.

2. Selection of appropriate OAP: after the decision is made on which OAP norms to consider, the selective efficiency of the norms for each OAP is determined by computing a phi coefficient between the OAP norms and the criterion of the occupational sample. An occupation qualifies for inclusion in an existing OAP if the chi square is significant at the .05 level, and the proportion of the sample that does not meet the norms is between .10 and .60. An occupation that qualifies for two or more OAP's on the basis of these standards is assigned to the OAP that yields the highest phi coefficient unless job analysis information indicates that one of the other OAP's for which the job qualifies would be a more logical placement.

TYPES OF ENTRIES IN 1970 EDITION OF OAP STRUCTURE

In 1969–70 the existing OAP structure was expanded in terms of number of specific batteries accommodated and total number of occupations included in the structure. This resulted in a large increase in total number of OAP's (from 36 to 62), the addition of occupations which do not meet all of the requirements discussed earlier and the arrangement of occupations within an OAP according to Worker Trait Groups as shown in the Dictionary of Occupational Titles (U.S. Department of Labor, 1965). The various types of entries in this revised structure are as follows:

An asterisk (*) preceding the occupational code of an occupation in Section II indicates that (1) a test development study has been conducted on the occupation, (2) the OAP norms contain the same aptitudes and are within 10 points of the specific norms established for the occupation when the specific norms involve three aptitudes, and (3) the application of the OAP norms to the criterion data yielded statistically significant results. (A Yates' corrected chi square at the .10 level)

A double asterisk (**) preceding the code of an occupation in Section II indicates that (1) a test development study has been conducted on the occupation and (2) the specific norms established for this occupation do not meet all of the requirements for incorporation (i.e. one or more aptitudes in the OAP norms may be different from those in the specific norms or one or more aptitudes in the OAP may not be within 10 points of the specific norms). However, application of the OAP norms to the criterion data yielded statistically significant results (.10 level) and, therefore, the occupation was entered into the OAP. A double asterisk job usually will not qualify for entry as an asterisk job in another OAP. In the few instances where a double asterisk job does qualify for inclusion elsewhere, that OAP was judged to be inappropriate based on job analysis information.

A dagger (†) preceding the occupational code of an occupation in Section II indicates that (1) a test development study has been conducted on the occupation and (2) the norms established for the occupation may or may not be similar to the norms of the OAP in which it has been entered and (3) application of the OAP norms to the criterion data does not produce statistically significant results. However, based on the job analysis information the occupation was judged to be related to other occupations in the OAP which met the necessary requirements. Using this information the occupation was entered into the OAP. A dagger job usually will not qualify for entry as an asterisk or double asterisk job in another OAP. In the few instances where a dagger job does qualify for inclusion elsewhere, that OAP was judged to be inappropriate based on job analysis information.

All other occupations listed in Section II have no symbol preceding the occupational code. This indicates that no test development study has been conducted on the occupation. However, the occupation has been entered into the OAP based solely on the relationship of this occupation to the other occupations in the OAP which have been researched and met the necessary requirements for OAP entry.

PERIODIC REVISION OF OAP STRUCTURE

As indicated earlier, data for each new test development study are analyzed to determine applicability of existing OAP norms for the occupation studied. When results from a substantial number of new studies become available, additional analyses are performed with the objective of modifying the Occupational Aptitude Pattern structure to increase occupational coverage of the OAP's and increase validity of the OAP norms. If the analysis indicates that this can be achieved, the structure is revised. The revision involves a combination of the following:

1. Modification of aptitude cutting scores for one or more OAP's.
2. Addition of new OAP's.
3. Deletion of old OAP's.
4. Shifting occupations from one OAP to another.
5. Addition of new occupations to the structure.

REFERENCE

U.S. Department of Labor, *Dictionary of Occupational Titles*, Volume II. Washington: U.S. Government Printing Office, 1965.

11. Validity of Occupational Aptitude Pattern Norms

A basic assumption underlying the development of the GATB is that a large variety of tests can be reduced to several factors and that a large variety of occupations can also be clustered into groups according to similarities in the abilities required to perform them. As Super (1953) points out, aptitude tests need to be "multipotential"; that is, they need to be useable for a variety of occupations with one individual if they are going to be useful for counseling. The data presented in Table 11-1 show that the GATB is multipotential.

After specific norms have been established for an occupation, the occupation is grouped with or assigned to the family of occupations to which it is most closely related. Occupations are continually added to the families already established, the composition of the families is continually revised, and new Occupational Aptitude Patterns are added. In developing norms for families of occupations, a core of validity data for two or more occupations has been used to cover a broader family which also includes occupations that have been added on the basis of judgments about the job analysis information. (See Chapter 10 of this Section.)

The validity data for the GATB Occupational Aptitude Pattern (OAP) norms for families of occupations are shown in Table 11-1. This table is based on the OAP structure in the 1970 edition of Section II of the *Manual for the GATB.* The table lists the Occupational Aptitude Pattern number, the occupational titles and codes as given in the *Dictionary of Occupational Titles* (U.S. Department of Labor, 1965), the number of cases in each occupational sample (total or combined sample for the occupation), and the phi coefficient of correlation between the OAP norms and the dichotomized criterion for each sample. All phi coefficients shown have a corresponding chi square value (with Yates' correction) significant at least at the .05 level.

Where a dagger (†) is shown instead of a phi coefficient, the chi square value is not significant at the .10 level. In these studies, job analysis judgments were used in the OAP allocation of the job even though statistically significant validity was not obtained. The data shown in Table 11-1 are based on samples used in the development of specific aptitude test batteries through S-452. (An "S" number is assigned to each specific aptitude test battery at the time it is developed and is used to identify the battery. Validity data for specific aptitude test batteries through S-452 are shown in Tables 9-1, 9-2, and 9-3 in Chapter 9 of this section.)

OAP norms must have validity for the occupations in the family on which specific aptitude test batteries have been developed just as the specific occupational norms must have validity for the occupation (Dvorak, 1953). For example, specific norms of Aptitudes P and M with minimum scores of 70, and 75 respectively were established for the occupation of Welder, Production Line 812.884. These norms yielded a phi coefficient of .58 with the criterion (see Table 9-1). Following the procedures described in Chapter 10 of this Section, the occupation of Welder, Production Line was assigned to the Occupational Aptitude Pattern which consists of Aptitudes S, P, and M (OAP 48) with minimum scores of 75, 75, and 75 respectively. This pattern yielded a phi coefficient of .57 with the criterion.

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Table 11–1. Validity of Norms for Occupational Aptitude Patterns

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 1	WTG p. 371 ENGINEERING RESEARCH AND DESIGN		
G–125	003.081 Electrical Engineer (profess. & kin.)	424	.27
N–115	005.081 Civil Engineer (profess. & kin.)	424	.27
S–115	007.081 Mechanical Engineer (profess. & kin.)	424	.27
	008.081 Chemical Engineer (profess. & kin.)	424	.27
	WTG p. 375 ENGINEERING, SCIENTIFIC AND TECHNICAL COORDINATION		
	012.168 Systems Analyst, Business Electronic Data Processing (profess. & kin.)	55	.31
	WTG p. 468 MATHEMATICS, PHYSICAL SCIENCES, AND RELATED RESEARCH		
	020.088 Mathematician (profess. & kin.)	52	†
	020.188 Programmer, Business (profess. & kin.)	257	.31
	020.188 Programmer, Engineering and Scientific (profess. & kin.)	72	.35
	WTG p. 473 MEDICAL, VETERINARY, AND RELATED SERVICES		
	070.108 General Practitioner (medical ser.)	49	.43
OAP 2	WTG p. 245 MANAGERIAL WORK		
G–110	077.168 Dietitian (profess. & kin.)	57	.35
V–105	187.168 Director, Funeral (per. ser.)	50	.33
N–105	187.168 Manager, Theater (amuse. & rec.)	32	.35
	WTG p. 250 INTERVIEWING, INFORMATION-GIVING, AND RELATED WORK		
	166.268 Employment Interviewer (profess. & kin.)	71	.35
	169.268 Claims Taker, Unemployment Benefits (gov. ser.)	71	.35
	249.268 Survey Worker (clerical)	130	.39
	WTG p. 261 SCHEDULING, DISPATCHING, EXPEDITING, AND RELATED WORK		
	193.168 Air-Traffic-Control Specialist, Tower (gov. ser.)	152	.21
	919.168 Dispatcher, Motor Vehicle (clerical)	50	.37
	WTG p. 274 TYPESETTING, REPRODUCING, AND RELATED MACHINE WORK		
	213.382 Digital-Computer Operator (clerical)	77	.42
	WTG p. 294 SOCIAL SCIENCE, PSYCHOLOGICAL, AND RELATED RESEARCH		
	054.088 Sociologist (profess. & kin.)	51	†
	WTG p. 296 GUIDANCE AND COUNSELING		
	045.108 Counselor (profess. & kin.) II	53	.22
	195.108 Case Worker (profess. & kin.)	106	.27
	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
	338.381 Embalmer (per. ser.)	50	.33
	WTG p. 341 HIGH SCHOOL, COLLEGE, UNIVERSITY, AND RELATED EDUCATION		
	091.228 Teacher, Secondary School (education)	497	.31

Table 11-1. Validity of Norms for Occupational Aptitude Patterns—**Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 2	WTG p. 343 KINDERGARTEN, ELEMENTARY SCHOOL AND		
(cont.)	RELATED INFORMATION		
	092.228 Teacher, Elementary School (education)	497	.31
	WTG p. 381 ENGINEERING AND RELATED WORK		
	007.187 Part Programer, Numerical Control II (mach. shop)	57	.43
	WTG p. 418 MATERIALS ANALYSIS AND RELATED WORK		
	029.281 Laboratory Tester (any ind.)	118	†
	WTG p. 473 MEDICAL, VETERINARY, AND RELATED SERVICES		
	071.108 Osteopathic Physician (medical ser.)	93	.23
OAP 3	WTG p. 294 SOCIAL SCIENCE, PSYCHOLOGICAL AND RE-		
G–110	LATED RESEARCH		
V–105	166.088 Job Analyst (profess. & kin.)	59	.21
S–100	WTG p. 435 OPERATING-CONTROLLING		
	559.782 Pilot-Control Operator (chem.; plastics mat.)	42	.43
	WTG p. 488 DEMONSTRATION AND SALES WORK		
	276.358 Salesman, Construction Machinery (whole. tr.)	113	.21
OAP 4	WTG p. 237 ADMINISTRATION		
G–110	163.118 Manager, City Circulation (print. & pub.)	38	.45
N–110	WTG p. 245 MANAGERIAL WORK		
Q–105	100.168 Librarian (library)	281	.20
	WTG p. 252 ACCOUNTING, AUDITING, AND RELATED WORK		
	160.188 Accountant (profess. & kin.)	84	.36
	160.188 Auditor (profess. & kin.)	84	.36
	169.188 Underwriter	81	.16
	WTG p. 418 MATERIAL ANALYSIS AND RELATED WORK		
	074.181 Pharmacist (profess. & kin.)	64	.18
OAP 5	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
G–105	625.281 Diesel Mechanic (any ind.)	52	.33
N–105	NO WTG		
S–105	011.— Metallurgical Technology Institute Training	59	†
	003.— Electrical Technology Institute Training	63	.24
	008.— Industrial Chemical Technology Institute Training	55	.26
	008.— 011.— } Chemical-Metallurgical Technology	55	.24
	007.— Mechanical Technology Institute Training	55	.27
	012.— Industrial Technical Institute Training	35	†
	828.— Computer Technology Training	179	.35
OAP 6	WTG p. 232 ART WORK		
G–105	141.081 Illustrator (profess. & kin.)	52	.26
S–110	WTG p. 466 SCIENTIFIC RESEARCH		
K– 95	040.081 Forester (profess. & kind.)	80	†
	WTG p. 473 MEDICAL, VETERINARY AND RELATED SERVICES		
	073.108 Veterinarian (medical ser.)	72	.18

***Table 11-1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 7	WTG p. 232 ART WORK		
G-105	142.081 Clothes Designer (profess. & kin.)	149	.27
S- 95	WTG p. 473 MEDICAL, VETERINARY, AND RELATED SERVICES		
P-100	072.108 Dentist (medical ser.)	177	.21
	WTG p. 477 NURSING, X-RAY, AND RELATED SERVICES		
	078.368 Dental Hygienist (medical ser.)	83	.54
	WTG p. 514 MOTION PICTURE PROJECTING, PHOTOGRAPHIC MACHINE WORK AND RELATED ACTIVITIES		
	972.382 Photographer, Lithographic (print. & pub.)	55	.33
OAP 8	WTG p. 287 TYPING AND RELATED RECORDING		
G-105	208.588 Typesetter-Perforator Operator (print. & pub.)	183	.25
Q-100	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
K- 90	806.381 Inspector, Assemblies and Installations (aircraft mfg.)	87	.20
	WTG p. 477 NURSING, X-RAY AND RELATED SERVICES		
	075.378 Nurse, General Duty (medical ser.)	80	.32
OAP 9	WTG p. 416 INVESTIGATING, PROTECTING AND RELATED WORK		
G-100			
V-105	241.168 Claim Adjuster (insurance)	106	.24
Q- 95	WTG p. 477 NURSING, X-RAY AND RELATED SERVICES		
	079.368 Psychiatric Technician (medical ser.)	73	.27
	WTG p. 479 CHILD AND ADULT CARE		
	359.878 Teacher, Nursery School (any ind.)	83	.23
OAP 10	WTG p. 237 ADMINISTRATION		
G-100	189.118 Manager, Industrial Organization (any ind.)	70	.26
V-100	WTG p. 435 OPERATING-CONTROLLING		
S- 90	954.782 Sewage-Plant Operator (any ind.)	61	.35
	954.782 Water-Treatment-Plant Operator (waterworks)	61	.35
	WTG p. 477 NURSING, X-RAY AND RELATED SERVICES		
	078.368 Radiologic Technologist (medical ser.)	75	.34
	079.378 Physical Therapist (medical ser.)	88	.21
OAP 11	WTG p. 435 OPERATING-CONTROLLING		
G-100	952.782 Substation Operator (light, heat, & power)	102	.19
V- 90	952.782 Switchboard Operator (light, heat, & power)	102	.19
Q- 90	952.782 Turbine Operator (light, heat, & power)	102	.19
	WTG p. 489 DEMONSTRATION AND SALES WORK		
	250.358 Salesman, Real Estate (real estate)	52	.30
	WTG p. 507 MISCELLANEOUS PERSONAL SERVICE WORK		
	352.878 Airplane Stewardess (air trans.)	76	.34
OAP 12	WTG p. 299 SUPERVISORY WORK		
G-100	726.134 Electronics Foreman (electronics)	72	.34
V- 90			
M- 95			

Table 11-1. Validity of Norms for Occupational Aptitude Patterns—**Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	ϕ
OAP 13	WTG p. 245 MANAGERIAL WORK		
G-100	185.168 Manager, Retail Food (ret. tr.)	61	.41
P-100	185.168 Manager, Store I (ret. tr.)	51	†
Q-100	WTG p. 278 STENOGRAPH AND RELATED WORK		
	202.388 Stenographer (clerical)	400	.32
	WTG p. 287 TYPING AND RELATED RECORDING		
	203.588 Typist (clerical)	400	.32
	209.588 Clerk-Typist (clerical)	400	.32
	WTG p. 416 INVESTIGATING, PROTECTING, AND RELATED WORK		
	375.268 Patrolman (gov. ser.)	166	.16
	WTG p. 418 MATERIAL ANALYSIS AND RELATED WORK		
	078.281 Medical Technologist (medical ser.)	113	.27
	WTG p. 447 TENDING		
	556.885 Blown-Plastic-Container-Machine Operator (fabric. plastics prod.)	58	.23
OAP 14	WTG p. 245 MANAGERIAL WORK		
G- 95	185.168 Proprietor-Manager, Retail Automotive Service (ret. tr.)	80	.22
N- 90	WTG p. 258 INFORMATION GATHERING, DISPENSING, VERIFYING AND RELATED WORK		
Q- 95			
	205.368 Employment Clerk (clerical)	57	.27
	WTG p. 265 FACILITIES, SERVICES, AND MOVEMENT ALLOCATING AND EXPEDITING WORK		
	242.368 Hotel Clerk (hotel & rest.)	54	†
	242.368 Room Clerk (hotel & rest.)	54	†
	WTG p. 269 CASHIERING		
	299.468 Grocery Checker (ret. tr.)	237	.28
	WTG p. 420 APPRAISING AND INVESTIGATING WORK		
	199.187 Radiation Monitor (profess. & kin.)	55	.26
	WTG p. 435 OPERATING-CONTROLLING		
	213.786 Tabulating-Machine Operator (clerical)	203	.19
	653.782 Folding-Machine Operator (print. & pub.)	50	.37
	WTG p. 488 DEMONSTRATION AND SALES WORK		
	289.358 Counterman, Automotive Parts	53	.25
	289.458 Salesperson, General (ret. tr.; whole, tr.)	96	.20
	292.358 Bakery-Wagon Driver (bake. prod.)	52	.19
	292.358 Routeman, Retail, Dairy (dairy prod.)	61	.22
	292.358 Routeman, Wholesale, Dairy (dairy prod.)	110	†
OAP 15	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
G- 95	601.381 Template Maker, Aircraft (aircraft mfg.)	33	.52
S- 95	637.281 Refrigeration Mechanic (any ind.)	32	.34
M- 85	822.281 Central Office Repairman (tel. & tel.)	64	†
	WTG p. 322 MANIPULATING		
	373.884 Fire Fighter (any ind.)	60	.37

***Table 11-1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 15 (cont.)	WTG p. 413 TECHNICAL WORK, SCIENCE AND RELATED FIELDS		
	467.384 Artificial Breeding Technician (agric.)	59	.27
	WTG p. 486 SALES AND SERVICE WORK		
	626.251 Service Engineer (mach. tool & access.)	50	.58
	637.251 Refrigeration and Heating Mechanic (any ind.)	66	†
	WTG p. 477 NURSING, X-RAY AND RELATED SERVICES		
	079.378 Surgical Technician (medical ser.)	50	.18
OAP 16 G- 90	WTG p. 265 FACILITIES, SERVICES, AND MOVEMENT ALLOCATING AND EXPEDITING WORK		
V- 95	919.368 Ticket Agent (any ind.)	55	.40
N- 90	WTG p. 280 COMPUTING AND RELATED RECORDING		
	210.388 Bookkeeper (clerical) I	66	.42
OAP 17 G- 90	WTG p. 258 INFORMATION GATHERING, DISPENSING, VERIFYING AND RELATED WORK		
V- 90	237.368 Hospital-Admitting Clerk (medical ser.)	59	.29
Q-100	WTG p. 276 CLASSIFYING, FILING, AND RELATED WORK		
	206.388 File Clerk (clerical)	50	.59
	WTG p. 280 COMPUTING AND RELATED RECORDING		
	219.388 Clerk, General Office (clerical)	198	.16
	219.388 Ward Clerk (medical ser.)	50	†
	WTG p. 289 ROUTINE CHECKING AND RECORDING		
	375.588 Parking Enforcement Officer (gov. ser.)	56	.38
	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
	973.381 Compositor (print. & pub.)	107	.29
	WTG p. 345 MISCELLANEOUS INSTRUCTIVE WORK		
	159.228 Counselor, Camp	65	.25
	WTG p. 477 NURSING, X-RAY AND RELATED SERVICES		
	079.368 Medical Assistant (medical ser.)	49	.22
OAP 18	WTG p. 477 NURSING, X-RAY AND RELATED SERVICES		
G- 90	079.378 Nurse, Licensed Practical (medical ser.)	205	.34
V- 80	WTG p. 479 CHILD AND ADULT CARE		
K- 85	355.878 Nurse Aid (medical ser.)	199	.26
OAP 19	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
G- 85	862.281 Oil-Burner Installation-and-Serviceman (any ind.)	77	†
S- 85	WTG p. 319 PRECISION WORKING		
F- 80	726.781 Electronics Assembler (electronics)	147	.17
	WTG p. 430 SET UP AND/OR ALL-ROUND MACHINE OPERATING		
	619.380 Production Mechanic, Tincans (tinware)	66	.22
	WTG p. 447 TENDING		
	685.885 Circular Knitter (Knit goods)	53	.43

Table 11-1. Validity of Norms for Occupational Aptitude Patterns—Continued.

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 20	WTG p. 267 PAYING AND RECEIVING		
G- 85	212.368 Teller (banking)	50	.41
Q-100 F- 90	WTG p. 274 TYPESETTING, REPRODUCING AND RELATED MACHINE WORK		
	213.582 Key-Punch Operator (clerical)	193	.28
	WTG p. 299 SUPERVISORY WORK (FARMING, LOGGING, MANUFACTURING, PROCESSING, CONSTRUCTION, AND RELATED ACTIVITIES)		
	197.130 Engineer (water trans.)	64	.19
	WTG p. 322 MANIPULATING		
	709.884 Cable Assembler (wirework)	53	.32
	WTG p. 477 NURSING, X-RAY, AND RELATED SERVICES		
	079.378 Dental Assistant (medical ser.)	53	.25
	NO WTG		
	65X.XXX Printing Curricula	70	.16
	97X.XXX		
OAP 21	WTG p. 322 MANIPULATING		
G- 85	706.884 Coil Assembler (elec. equip.)	61	.38
K- 70	827.884 Air-Conditioning-Unit Installer (refrig. equip.)	61	.38
M- 75	WTG p. 430 SET UP AND/OR ALL-ROUND MACHINE OPERATING		
	542.280 Stillman (petrol. refin.)	63	.31
OAP 22	WTG p. 245 MANAGERIAL WORK		
G- 80	187.168 Director, School Lunch Program (hotel & rest.)	87	.43
V- 80 Q- 80	WTG p. 461 SUPERVISORY WORK (SERVICES AND RELATED ACTIVITIES)		
	319.138 Food-Service Supervisor (hotel & rest.)	50	†
	WTG p. 479 CHILD AND ADULT CARE		
	355.878 Psychiatric Aid (medical ser.)	241	.24
OAP 23 G- 80	WTG p. 261 SCHEDULING, DISPATCHING, EXPEDITING, AND RELATED WORK		
N- 80	221.387 Stock Chaser (aircraft mfg.)	51	.36
Q- 80	WTG p. 282 SORTING, INSPECTING, MEASURING AND RELATED WORK		
	224.487 Weighing-Station Operator (gov. ser.)	98	.41
	WTG p. 360 HANDLING		
	920.887 Garment Packer (garment)	51	.22
	WTG p. 435 OPERATING-CONTROLLING		
	954.782 Water Filterer (waterworks) II	51	.35
	WTG p. 444 DRIVING-OPERATING		
	903.883 Trailer-Tank-Truck Driver (petrol. refin.; ret. tr.; whole. tr.)	142	.25
	904.883 Tractor-Trailer-Truck Driver (any ind.)	142	.25
OAP 24	WTG p. 289 ROUTINE CHECKING AND RECORDING		
G- 80	209.588 Copy Holder (clerical)	105	.15

Table 11–1. Validity of Norms for Occupational Aptitude Patterns—**Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	ϕ
P- 85	209.688 Proofreader (print. & pub.) I	105	.15
Q- 90			
	WTG p. 322 MANIPULATING		
	726.884 Cable Maker (elec. equip., electronics)	100	.31
	WTG p. 427 PROTECTING AND RELATED WORK		
OAP 25	372.868 Correction Officer (gov. ser.)	51	.19
G- 80	WTG p. 280 COMPUTING AND RELATED RECORDING		
P- 90	941.488 Log Scaler (logging; paper & pulp; sawmill)	75	.45
K- 80	WTG p. 291 SWITCHBOARD SERVICE		
OAP 26	235.862 Central-Office Operator (tel. & tel.)	88	.32
G- 80	WTG p. 430 SET UP AND/OR ALL-ROUND MACHINE OPERATING		
K- 90			
M- 80	692.380 Firesetter (elec. equip.; electronics)	52	.39
	WTG p. 44 DRIVING-OPERATING		
	922.883 Fork-Lift-Truck Operator (any ind.)	66	.33
	WTG p. 447 TENDING		
OAP 27	681.885 Carding-Machine Operator (trim & stamp. art goods)	51	.49
G- 75	WTG p. 322 MANIPULATING		
K- 90	724.884 Resistor Winder, Hand (electronics)	50	.34
F-100	726.884 Core-Plane Wirer (electronics)	58	.17
	WTG p. 360 HANDLING		
OAP 28	920.887 Marker (any ind.) II	60	.22
G- 75	WTG p. 322 MANIPULATING		
F- 75	779.884 Fettler (brick & tile)	35	.37
M- 80	WTG p. 435 OPERATING-CONTROLLING		
	669.782 Woodworking-Machine Operator (woodworking)	59	.40
	WTG p. 447 TENDING		
	609.885 Production-Machine Operator (mach. shop)	50	.38
	920.885 Tea-Bag Operator (food prep., n.e.c.)	56	.25
OAP 29	076.885 Mounter, Color Film (any ind.)	50	.39
V- 90	WTG p. 245 MANAGERIAL WORK		
Q-100	187.168 Manager, Restaurant or Coffee Shop (hotel & rest.)	76	.20
K- 90	WTG p. 248 CONSULTATIVE AND BUSINESS SERVICES		
	168.268 Credit Man (ret. tr.; whole. tr.)	59	†
	WTG p. 258 INFORMATION GATHERING, DISPENSING, VERIFYING AND RELATED WORK		
	249.368 Telephone Ad-Taker (print. & pub.)	60	.22
	WTG p. 274 TYPESETTING, REPRODUCING AND RELATED MACHINE WORK		
	650.582 Linotype Operator (print. & pub.)	164	.17
	650.582 Monotype-Keyboard Operator (print. & pub., type found.)	52	†
	WTG p. 276 CLASSIFYING, FILING AND RELATED		
	219.388 Coding Clerk (clerical)	64	.23
	WTG p. 289 ROUTINE CHECKING AND RECORDING		
	231.688 Distribution Clerk (gov. ser.)	80	.28

***Table 11-1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	ϕ
OAP 29	WTG p. 291 SWITCHBOARD SERVICE		
(cont.)	235.862 Telephone-Answering-Service Operator (bus. ser.)	56	†
OAP 30	WTG p. 414 TECHNICAL WORK, SCIENCE AND RELATED FIELDS		
V- 85			
N- 85	441.384 Forester Aid (gov. ser.)	78	.29
K- 85	WTG p. 501 CUSTOMER SERVICE WORK, N.E.C.		
	290.478 Sales Clerk (ret. tr.)	59	.31
OAP 31	WTG p. 385 SURVEYING, PROSPECTING, AND RELATED WORK		
N-105			
S-105	018.188 Surveyor (profess. & kin.)	62	.32
Q-100	WTG p. 418 MATERIALS ANALYSIS AND RELATED WORK		
	078.381 Medical Laboratory Assistant (medical ser.)	81	.36
	WTG p. 466 SCIENTIFIC RESEARCH		
	041.081 Biologist (profess. & kin.)	50	.22
OAP 32	WTG p. 430 SET UP AND/OR ALL-ROUND MACHINE OPERATING		
N-100			
F- 80	575.380 Press Operator (glass mfg.)	51	.54
M- 95	WTG p. 503 MISCELLANEOUS CUSTOMER SERVICE WORK		
	915.867 Automobile-Service-Station Attendant (auto. ser.)	52	.22
OAP 33	WTG p. 280 COMPUTING AND RELATED RECORDING		
N- 95	215.388 Bookkeeping-Machine Operator (clerical) I	102	.24
P-100	216.488 Calculating-Machine Operator (clerical)	53	.33
Q-105	216.488 Comptometer Operator (clerical)	53	.33
OAP 34	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
N- 90	651.381 Overlay Cutter (print. & pub.)	293	.28
S- 95	661.281 Patternmaker, Wood (found.)	111	.43
P- 90	710.281 Instrument Repairman (any ind.)	65	.22
	736.381 Process Inspector (ordinance)	57	.37
	806.381 Shipfitter (ship & boat bldg. & rep.)	62	.24
	809.381 Structural-Steel Layout Man (any ind.)	50	.25
	971.381 Stripper (print. & pub.)	53	.47
	WTG p. 319 PRECISION WORKING		
	865.781 Glazier (const.)	55	.24
	WTG p. 377 DRAFTING & RELATED WORK		
	001.281 Draftsman, Architectural (profess. & kin.)	537	.22
	005.281 Draftsman, Civil (profess. & kin.)	537	.22
	005.281 Draftsman, Structural (profess. & kin.)	537	.22
	010.281 Draftsman, Mechanical (profess. & kin.)	537	.22
	010.281 Draftsman, Geological (profess. & kin.)	537	.22
	017.281 Detailer (profess. & kin.)	537	.22
	019.281 Engineering Aide (profess. & kin.)	57	.25
	WTG p. 379 TECHNICAL WORK, ENGINEERING AND RELATED FIELDS		
	003.181 Electronic Technician (profess. & kin.)	97	.10

***Table 11-1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	ϕ
OAP 34 (cont.)	WTG p. 430 SET UP AND/OR ALL-ROUND MACHINE OPERATING		
	600.280 Patternmaker, Metal (found.)	111	.43
	601.280 Tool-and-Die Maker (mach. shop)	246	.48
	WTG p. 435 OPERATING-CONTROLLING		
	559.782 Chemical Operator (chem.) III	50	†
	651.782 Cylinder Press Man (print. & pub.)	293	.28
	651.782 Engraving-Press Operator (print. & pub.)	293	.28
	651.782 Offset Press Man (print. & pub.)	293	.28
	651.782 Platen Press Man (print. & pub.)	293	.28
	651.782 Web-Press Man (print. & pub.)	293	.28
	659.782 Embossing-Press Operator (print. & pub.)	293	.28
OAP 35	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
N- 85	620.281 Construction-Equipment Mechanic (const.)	50	†
S- 95	621.281 Aircraft-and-Engine Mechanic (aircraft mfg.; air trans.)	75	.36
F- 80	720.281 Radio Repairman (any ind.)	127	.26
	720.281 Television Service and Repairman (any ind.)	127	.26
	726.281 Electronics Mechanic (electronics)	50	.22
	824.281 Electrician (any ind.)	253	.28
	829.281 Inter-Com Serviceman (any ind.) II	53	.26
	829.281 Pinsetter Mechanic, Automatic (any ind.)	83	.51
	WTG 430 SET UP AND/OR ALL-ROUND MACHINE OPERATING		
	689.280 Knitting-Machine Fixer, Socks	51	.21
OAP 36	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
N- 85	518.381 Molder, Bench and Floor (found.)	54	.23
P- 95	WTG p. 319 PRECISION WORKING		
M- 90	842.781 Plasterer (const.)	66	.40
	WTG p. 322 MANIPULATING		
	712.884 Inserter (dental equip.)	100	.42
	WTG p. 360 HANDLING		
	712.887 Plastic Trimmer (dental equip.)	100	.42
OAP 37	WTG p. 271 INSPECTING AND STOCK CHECKING		
N- 80	619.387 Mill Inspector (iron & steel)	70	.33
S- 95	710.384 Inspector, Mechanical and Electrical (elec. equip.)	50	.29
M- 85	WTG p. 282 SORTING, INSPECTING, MEASURING AND RELATED WORK		
	619.685 Crusher Inspector (iron & steel)	70	.33
	619.687 Mill End Inspector (iron & steel)	70	.33
	619.687 Pipe and Coupling Sizer (iron & steel)	70	.33
	619.687 Pipe Walker (iron & steel)	70	.33
	619.687 Thread Inspector (iron & steel)	70	.33

Table 11-1. Validity of Norms for Occupational Aptitude Patterns—Continued.

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 37	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
(cont.)	299.381 Carpet Layer (ret. tr.)	101	.29
	620.281 Automobile Mechanic (auto. ser.)	247	.20
	620.281 Foreign Car Mechanic (auto. ser.)	247	.20
	638.281 Machinery Erector (engine & turbine; mach. mfg.)	55	†
	638.281 Manufacturer's Service Representative (mach. mfg.; mach. tool & access.)	95	.28
	638.281 Millwright (any ind.)	95	.28
	739.381 Die Maker (paper goods)	58	.41
	805.281 Boilermaker (boilermaking) I	81	.21
	860.381 Carpenter (const.)	119	.44
	862.381 Pipe Fitter (const.) I	411	.19
	862.381 Plumber (const.)	411	.19
	899.281 Maintenance Man, Factory or Mill (any ind.)	53	.34
	WTG p. 319 PRECISION WORKING		
	840.781 Painter (const.)	202	.26
	842.781 Lather (const.)	64	.23
	864.781 Floor Layer (const.; ret. tr.)	101	.28
	WTG p. 322 MANIPULATING		
	844.884 Cement Mason (const.)	52	.21
	863.884 Insulation Worker (const.)	50	.13
	WTG p. 430 SET UP AND/OR ALL-ROUND MACHINE OPERATING		
	600.280 Machinist (mach. shop) I	177	.34
	660.280 Cabinetmaker (woodworking)	112	.23
	NO WTG		
	97 .— Photo-Offset Lithography (print. & pub.)	105	.22
OAP 38	WTG p. 276 CLASSIFYING, FILING AND RELATED WORK		
N- 80	219.388 Programmer, Detail, Graphic Arts (clerical)	60	.41
S- 85	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
K- 80	801.381 Aircraft Mechanic, Armament (aircraft mfg)	51	.31
	825.281 Electrician, Airplane (aircraft mfg.)		
	861.381 Bricklayer (const.)	50	.29
	WTG p. 435 OPERATING-CONTROLLING		
	649.782 Cutting-and-Creasing Pressman	77	.15
	950.782 Stationary Engineer (any ind.)	50	.35
	952.782 Steam-Power-Plant Operator (light, heat, & power) II	120	.16
	975.782 Stereotyper (print. & pub.)	50	.28
	WTG p. 444 DRIVING-OPERATING		
	859.883 Operating Engineer (const.) II	92	.17
OAP 39 N- 80	WTG p. 258 INFORMATION GATHERING, DISPENSING, VERIFYING AND RELATED WORK		
Q- 95	099.368 Teacher Aid, Elementary School (education)	78	.32
K- 75	WTG p. 322 MANIPULATING		
	726.884 Capacitor Winder (electronics)	53	.34

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Table 11–1. Validity of Norms for Occupational Aptitude Patterns—**Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 40 N– 80	WTG p. 265 FACILITIES, SERVICES, AND MOVEMENT ALLOCATING AND EXPEDITING WORK		
Q– 85	912.368 Transportation Agent (air trans.)	50	.20
M– 80	WTG p. 271 INSPECTING AND STOCK CHECKING		
	223.387 Stock Clerk (clerical)	31	.28
	WTG p. 360 HANDLING		
	920.887 Merchandise Packer (any ind.)	77	.36
	WTG p. 507 MISCELLANEOUS PERSONAL SERVICE WORK		
	311.878 Waitress (hotel & rest.)	60	†
	311.878 Waitress (hotel & rest.) II	52	†
OAP 41	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
S– 95	821.381 Lineman, Repair (light, heat & power)	59	.20
Q– 85	972.281 Process Artist (print. & pub.)	66	.24
K– 75	972.381 Transferrer (print. & pub.) I	53	.24
OAP 42	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
S– 90	633.281 Adding-Machine Serviceman (any ind.)	117	.43
P– 85	633.281 Calculating-Machine Serviceman (any ind.)	117	.43
M– 85	633.281 Cash-Register Serviceman (any ind.)	117	.43
	633.281 Duplicating-Machine Serviceman (any ind.)	117	.43
	633.281 Office-Machine Serviceman (any ind.)	117	.43
	633.281 Typewriter Serviceman (any ind.)	117	.43
	693.381 Model Maker (aircraft mfg.) I	62	.54
	712.381 Dental-Laboratory Technician (medical ser.)	56	.22
	772.281 Glass Blower, Laboratory Apparatus (glass prod.; inst. & app.)	50	†
	804.281 Sheet-Metal Worker (any ind.)	79	.40
	807.381 Automobile-Body Repairman (auto ser.)	56	.43
	WTG p. 322 MANIPULATING		
	706.884 Power-Lawn-Mower Assembler (agric. equip.)	52	.33
	930.884 Rotary-Driller Helper (petrol. production)	53	.26
	WTG p. 430 SET UP AND/OR ALL-ROUND MACHINE OPERATING		
	604.280 Turret-Lathe Set-Up Operator, Tool (mach. shop)	36	.30
	619.380 Metal Fabricator (any ind.) I	51	.44
	675.380 Precision-Lens Grinder (optical goods)	52	†
	WTG p. 499 BEAUTICIAN AND BARBERING SERVICES		
	332.271 Cosmetologist (per. ser.)	99	.22
OAP 43	WTG p. 282 SORTING, INSPECTING, MEASURING		
S– 85	715.585 Timing-Machine Operator (clock & watch)	63	.61
P– 90	WTG p. 310 COOKING AND RELATED WORK		
F– 85	313.381 Cook (hotel & rest.)	160	.16
	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
	620.381 Automobile-Service-Station Mechanic (auto. ser.)	52	.24
	715.281 Repairman (clock & watch)	63	.61
	715.381 Hairspring Inspector (clock & watch) I	63	.61
	715.381 Train Inspector (clock & watch)	63	.61
	785.381 Seamstress (any ind.)	55	.40

***Table 11-1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 43	WTG p. 319 PRECISION WORKING		
(cont.)	715.781 Banking Adjuster (clock & watch)	63	.61
	WTG p. 322 MANIPULATING		
	715.884 Balance Assembler (clock & watch)	63	.61
	715.884 Mechanism Assembler (clock & watch)	63	.61
	715.884 Oiler (clock & watch)	63	.61
	WTG p. 360 HANDLING		
	715.887 Hairspring Pinner (clock & watch)	63	.61
	WTG p. 435 OPERATING-CONTROLLING		
	683.782 Weaver (fiber rugs; paper goods)	94	.29
	WTG p. 447 TENDING		
	514.885 Die-Casting-Machine Operator (found.) II	50	.24
	715.885 Endshake Adjuster (clock & watch)	63	.61
OAP 44	WTG p. 282 SORTING, INSPECTING, MEASURING, AND RELATED WORK		
S- 80			
P- 85	712.687 Inspector, Plastic (dental equip.)	55	.52
K- 90	715.687 Lancing Gager (clock & watch)	56	.56
	WTG p. 322 MANIPULATING		
	709.884 Straightener (clock & watch)	56	.56
	715.884 Burrer (clock & watch)	56	.56
	715.884 Staker (clock & watch)	56	.56
	740.884 Decorator, Hand (pottery & porc.)	70	†
	WTG p. 360 HANDLING		
	712.887 Inspector (dental equip.)	55	.52
	715.887 Barrel-Arbor Assembler (clock & watch)	56	.56
	715.887 Main Arbor & Hook Assembler (clock & watch)	56	.56
	715.887 Pinion Reamer (clock & watch)	56	.56
	715.887 Retaining-Spring Attacher (clock & watch)	56	.56
	715.887 Rocking-Bar Adjuster (clock & watch)	56	.56
	715.887 Tray Leader (clock & watch)	56	.56
	WTG p. 433 SET UP AND ADJUSTMENT		
	641.780 Envelope-Machine Set-Up Man (paper goods)	51	.30
	WTG p. 447 TENDING		
	603.885 Burrer, Machine (clock & watch)	56	.56
	606.885 Reamer (clock & watch)	56	.56
OAP 45	WTG p. 319 PRECISION WORKING		
S- 80	526.781 Baker (bake prod.)	65	.42
Q- 90	WTG p. 322 MANIPULATING		
F- 80	760.884 Bench Carpenter (any ind.)	48	.31
	WTG p. 360 HANDLING		
	724.887 Coil Finisher (elec. equip.; electronics)	53	.41
	WTG p. 447 TENDING		
	643.885 Bindery Worker (print. & pub.)	103	.17
	649.885 Printed Napkin Machine Operator (paper goods)	55	.27

***Table 11–1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 46	WTG p. 319 PRECISION WORKING		
S– 80	845.781 Painter, Automobile (auto. ser.)	55	.26
K– 80	WTG p. 322 MANIPULATING		
M– 80	389.884 Exterminator (any ind.)	54	†
	411.884 Farm Hand, Dairy (agric.) I	54	.38
	571.884 Rifter (minerals & earth)	38	.57
	WTG p. 447 TENDING		
	660.885 Drawtwist Operator (woodworking)	34	.42
OAP 47	WTG p. 271 INSPECTING AND STOCK CHECKING		
S– 80	715.387 Wheel Inspector (clock & watch)	59	.44
F– 80	WTG p. 282 SORTING, INSPECTING, MEASURING		
M– 85	715.687 Inspector, Balance Wheel and Impulse Pin (clock & watch)	59	.44
	WTG p. 312 CRAFTSMANSHIP		
	639.281 Sewing-Machine Repairman (any ind.)	73	.24
	715.381 Hairspring Vibrator (clock & watch)	59	.44
	WTG p. 322 MANIPULATING		
	706.884 Assembler, Small Parts (any ind.)	30	.35
	710.884 Gyroscope Assembler (inst. & app.)	50	.37
	715.884 Balance Truer (clock & watch) II	59	.44
	715.884 Put-In-Beat Adjuster (clock & watch)	59	.44
	721.884 Electric-Motor Winder (elec. equip.)	36	.44
	780.884 Upholsterer (furn.) II	90	.44
	788.884 Hand Sewer, Shoes (boot & shoe)	156	.40
	810.884 Welder, Arc (welding)	49	.20
	812.884 Welder, Combination (welding)	136	.49
	WTG p. 356 FEEDING-OFFBEARING		
	509.886 Laborer, General (iron & steel)	64	.36
	WTG p. 360 HANDLING		
	715.887 Balance-Wheel-And-Impulse-Pin Subassembler (clock & watch).	59	.44
	WTG p. 360 HANDLING		
	715.887 Hairspring Solderer (clock & watch)	59	.44
	WTG p. 430 SET UP AND/OR ALL-ROUND OPERATING		
	920.280 Packaging-Machine Mechanic (drug prep. & rel. prod.)	103	.42
	WTG p. 435 OPERATING-CONTROLLING		
	509.782 Rewind Operator (window shade & fix.)	51	.41
	613.782 Coil Opener (iron & steel)	64	.36
	613.782 Cold-Mill Operator (iron & steel)	51	.41
	613.782 Hot-Mill Operator (nonferr. metal alloys)	51	.41
	615.782 Slitting-Machine Operator (any ind.) II	51	.41
	684.782 Transfer Knitter (hosiery)	52	.28
	689.782 Hosiery Looper (hosiery)	87	.26
	952.782 Power-Plant Operator (any ind.) I	54	.44

***Table 11–1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 47	WTG p. 444 DRIVING-OPERATING		
(cont.)	921.883 Conveyor Man (iron & steel) II	64	.36
	921.883 Cooling-Conveyor Operator (iron & steel)	64	.36
	921.883 Tester-Conveyor Operator (iron & steel)	64	.36
	921.883 Thread-Entry-Conveyor Operator (iron & steel)	64	.36
	921.883 Yard-Transfer-Conveyor Operator (iron & steel)	64	.36
	WTG p. 447 TENDING		
	503.885 Payoff Operator (window shade & fix.)	51	.41
	920.885 Packager, Machine (any ind.)	85	.17
	No WTG		
	70xx and 72xx Electro-Mechanical Assembly Curriculum	50	†
OAP 48 S- 75	WTG p. 282 SORTING, INSPECTING, MEASURING AND RELATED WORK		
P- 75	669.687 Veneer Matcher (veneer & plywood)	41	.52
M- 75	WTG p. 312 CRAFTSMANSHIP		
	621.381 Assembler, Aircraft Power Plant (aircraft mfg.)	52	.48
	801.381 Aircraft Mechanic, Rigging and Controls (aircraft mfg.)	52	.48
	806.381 Assembler, Aircraft Structures and Surfaces (aircraft mfg.)	52	.48
	862.381 Aircraft Mechanic, Plumbing and Hydraulics (aircraft mfg.)	52	.48
	WTG p. 322 MANIPULATING		
	316.884 Meat Cutter (ret. tr.; whole. tr.)	169	.61
	812.884 Welder, Production Line (welding)	116	.57
	827.884 Refrigerator Cabinet Installer (refrigerat. equip.)	36	.36
	WTG p. 356 FEEDING-OFFBEARING		
	689.886 Spooler Operator, Automatic (textile)	52	†
	WTG p. 435 OPERATING-CONTROLLING		
	699.782 Die Cutter (any ind.)	86	.23
	WTG p. 447 TENDING		
	529.885 Wrapper Layer (tobacco)	46	.28
	529.885 Wrapper Layer and Examiner, Soft Work (tobacco)	46	.28
	640.885 Rewinder Operator (paper goods)	87	.25
	641.885 Carton-Forming-Machine Operator (paper goods) I	53	.52
	649.885 Bag-Machine Operator (paper goods)	55	.50
	649.885 Waxed-Bag Machine Operator (paper goods)	55	.50
	WTG p. 503 MISCELLANEOUS CUSTOMER SERVICE WORK		
	317.877 Dietary Aide (hotel & rest.; medical ser.)	49	.36
OAP 49 P- 90	WTG p. 282 SORTING, INSPECTING, MEASURING, AND RELATED WORK		
F- 85	684.687 Pairer (hosiery)	58	.31
M- 75	WTG p. 322 MANIPULATING		
	814.884 Solderer, Production Line (welding)	50	.59
	WTG p. 360 HANDLING		
	899.887 General-Labor Worker (iron & steel)	61	.61
	929.887 Take-Off Man (paper goods)	52	.24

Table 11-1. Validity of Norms for Occupational Aptitude Patterns—**Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 50 P- 85	WTG p. 282 SORTING, INSPECTING, MEASURING, AND RELATED WORK		
K- 85	529.687 Egg Candler (any ind.)	52	.20
M-100	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
	518.381 Hand Rammer (found.)	71	.23
	613.381 Guide Setter (iron & steel)	70	.41
	WTG p. 322 MANIPULATING		
	512.884 Second Helper, Open-Hearth (iron & steel)	55	.18
	WTG p. 360 HANDLING		
	519.887 Knockout Man (found.)	71	.23
	920.887 Cereal Packer (cereal)	54	.26
	WTG p. 435 OPERATING-CONTROLLING		
	613.782 Screwdown Operator (iron & steel)	70	.41
	613.782 Manipulator (iron & steel)	70	.41
	976.782 Multiple-Photographic-Printer Operator (any ind.)	50	.37
	WTG p. 444 DRIVING-OPERATING		
	518.883 Sand-Slinger Operator (found.)	71	.23
	WTG p. 447 TENDING		
	234.885 Machine Operator, Mass-Mailing (clerical)	51	.57
	556.885 Record-Press Tender (phonograph)	50	.50
OAP 51 P- 85	WTG p. 282 SORTING, INSPECTING, MEASURING, AND RELATED WORK		
K- 80	649.687 Paper Sorter And Counter (paper & pulp)	59	.42
M- 80	689.684 Burler (carpet & rug; textile)	52	.48
	WTG p. 319 PRECISION WORKING		
	806.781 Outboard-Motor Assembler (engine & turbine)	104	.38
	806.781 Gasoline-Engine Assembler (engine & turbine)	104	.38
	806.781 Internal-Combustion-Engine Assembler (engine & turbine)	104	.38
	WTG p. 322 MANIPULATING		
	700.884 Ring Maker (jewelry) III	55	.38
	730.884 Mounter, Clarinet (musical inst.)	30	.36
	737.884 Bomb-Fuse-Parts Assembler (ammunition)	90	.58
	750.884 Tire Builder, Automobile (rubber, tire & tube)	50	.33
	782.884 Mender (textile)	52	.48
	WTG p. 356 FEEDING-OFFBEARING		
	529.886 Shrimp Picker (can. & preserv.)	51	.54
	WTG p. 360 HANDLING		
	794.887 Scrapper (paper goods)	53	.28
	WTG p. 435 OPERATING-CONTROLLING		
	683.782 Levers-Lace-Machine Operator (textile)	54	.27
	690.782 Fancy Stitcher (boot & shoe)	113	.47
	690.782 Top Stitcher (boot & shoe)	113	.47
	690.782 Vamp Stitcher (boot & shoe)	113	.47
	691.782 Insulating-Machine Operator (insulated wire)	54	.36

***Table 11–1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 51	WTG p. 447 TENDING		
(cont.)	689.885 Balling-Machine Operator (textile) II	66	.25
	691.885 Pairing-Machine Operator (insulated wire)	54	.36
	WTG p. 507 MISCELLANEOUS PERSONAL SERVICE WORK		
	311.878 Countergirl (hotel & rest.)	50	.34
	311.878 Counterman, Lunchroom or Coffee Shop (hotel & rest.)	50	.34
OAP 52	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
P- 80	639.381 Vending-Machine Repairman (bus. ser.; coin mach.)	49	.25
Q- 90	809.381 Ornamental-Iron Worker (const.)	77	.52
M- 80	WTG p. 319 PRECISION WORK		
	801.781 Structural-Steel Worker (const.)	77	.52
	WTG p. 322 MANIPULATING		
	590.884 Processor, Solid Propellant (explosives)	59	.21
	712.884 Multi-Moulding-Unit Operator (dental equip.)	66	.24
	712.884 Heater Operator (dental equip.)	66	.24
	WTG p. 418 MATERIALS ANALYSIS		
	199.381 Radiographer (any ind.)	48	†
	WTG p. 430 SET UP AND/OR ALL-ROUND OPERATING		
	616.380 Set-Up Man, Sheet Metal (any ind.)	52	.41
	WTG p. 435 OPERATING-CONTROLLING		
	363.782 Pants-Presser (any ind.)	50	.38
	504.782 Heat Treater (heat treat.) I	78	.29
	504.782 Heat Treater (heat treat.) II	78	.29
	614.782 Wire Drawer (wire)	50	.40
	WTG p. 477 NURSING, X-RAY AND RELATED SERVICES		
	079.368 Occupational-Therapy Aid (medical ser.)	65	.25
OAP 53	WTG p. 322 MANIPULATING		
P- 80	723.884 Assembler, Components (elec. equip.)	55	.29
F- 80	725.884 Grid Operator (electronics)	63	.27
M- 95	754.884 Finisher, Hand (fabric. plastics prod.)	50	.60
	809.884 Insulation-Blanket Maker (aircraft mfg.)	55	.22
OAP 54	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
P- 75	739.381 Experimental Assembler (any ind.)	61	.39
K- 85	WTG p. 360 HANDLING		
F- 90	726.887 Mounter (electronics) I	208	.15
	WTG p. 499 BEAUTICIAN AND BARBERING SERVICES		
	330.371 Barber (per. ser.)	95	.31
OAP 55	WTG p. 271 INSPECTING AND STOCK CHECKING		
P- 75	774.387 Inspector-Packer (pottery & porc.)	50	.20
K- 75 M- 75	WTG p. 282 SORTING, INSPECTING, MEASURING AND RELATED WORK		
	369.687 Assembler (clean., dye., & press.; laund.)	149	.17
	WTG p. 312 CRAFTSMANSHIP AND RELATED WORK		
	866.381 Composition Roofer (const.)	50	.38

Table 11–1. Validity of Norms for Occupational Aptitude Patterns—**Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 55	WTG p. 356 FEEDING-OFFBEARING		
(cont.)	363.886 Flatwork Catcher (laund.)	149	.17
	363.886 Flatwork Feeder (laund.)	149	.17
	363.886 Flatwork Finisher (laund.)	149	.17
	363.886 Flatwork Folder (laund.)	149	.17
	WTG p. 360 HANDLING		
	404.887 Lemon Picker (agric.)	50	.30
	929.887 Trucker, Hand (any ind.)	149	.17
	WTG p. 444 DRIVING-OPERATING		
	921.883 Electric-Bridge-Crane Operator (any ind.)	30	.29
OAP 56 P- 75	WTG p. 282 SORTING, INSPECTING, MEASURING, AND RELATED WORK		
F- 80	529.687 Cherry Sorter (agric.; can. & preserv.; whole. tr.)	327	.30
M- 80	529.687 Fruit Sorter (agric.; can. & preserv.; whole. tr.)	327	.30
	529.687 Olive Sorter (agric.; can. & preserv.; whole. tr.)	327	.30
	573.687 Tile Sorter (brick & tile)	127	.30
	WTG p. 322 MANIPULATING		
	317.884 Food-Service Worker (hotel & rest.) II	100	.14
	732.884 Fishing-Rod Assembler (sports equip.)	56	.62
	733.884 Paint-Brush Maker (brush)	32	.31
	773.884 Paster (brick & tile)	127	.30
	WTG p. 356 FEEDING-OFFBEARING		
	529.886 Peeling-And-Coring-Machine Operator (can. preserv.)	54	.29
	689.886 Doffer (asbestos prod.; textile)	57	.19
	WTG p. 360 HANDLING		
	521.887 Egg Breaker (any ind.)	29	.50
	521.887 Nut Sorter (nut process.)	74	.21
	573.887 Tile Placer (brick & tile)	127	.30
	751.887 Cementer, Life Rafts (rubber goods)	56	.46
	806.887 Assembler, Automobile (auto. mfg.)	72	.35
	920.887 Apple Packer (agric.; whole. tr.)	327	.30
	920.887 Cherry Packer (agric.; whole. tr.)	327	.30
	920.887 Citrus-Fruit Packer (agric.; whole. tr.)	327	.30
	920.887 Packer (agric.; whole. tr.)	327	.30
	920.887 Pear Packer (agric.; whole. tr.)	327	.30
	920.887 Plum Packer (agric., whole. tr.)	327	.30
	WTG p. 435 OPERATING-CONTROLLING		
	207.782 Offset-Duplicating-Machine Operator (clerical)	86	.32
	615.782 Punch-Press Operator (any ind.) I	52	.37
	651.782 Printer-Slotter Operator (paper goods)	70	.47
	786.782 Sewing-Machine Operator, Lingerie (garment)	339	.29
	786.782 Sewing-Machine Operator, Men's Tailored Garments (garment)	339	.29
	786.782 Sewing-Machine Operator, Regular Equipment (garment)	339	.29
	786.782 Sewing-Machine Operator, Style Garments (garment)	339	.29
	787.782 Glove Sewer (glove & mit.)	339	.29
	787.782 Sewing-Machine Operator, Regular Equipment (any ind.)	339	.29
	787.782 Straw-Hat-Machine Operator (hat & cap)	339	.29

***Table 11–1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	ϕ
OAP 56	WTG p. 447 TENDING		
(cont.)	559.885 Pressman (rubber goods)	64	†
	559.885 Pressman, O-Rings (rubber goods)	30	.35
	684.885 Seamless-Hosiery Knitter (hosiery)	54	.57
	685.885 Tricot-Knitting-Machine Operator (knit goods)	51	.26
	920.885 Candy-Wrapping-Machine Operator (confection)	63	.30
	WTG p. 507 MISCELLANEOUS PERSONAL SERVICE WORK		
	319.878 Fountain Girl (hotel & rest.)	100	.19
OAP 57 Q- 95	WTG p. 282 SORTING, INSPECTING, MEASURING, AND RELATED WORK		
K- 95	684.684 Stocking Inspector (hosiery) I	57	.21
M- 85	759.687 Molded-Goods Inspector-Trimmer (rubber goods)	50	.18
	979.687 Ticket Examiner (print. & pub.)	34	.39
	WTG p. 287 TYPING AND RELATED RECORDING		
	209.588 Encoder (banking)	50	.30
	WTG p. 360 HANDLING		
	712.887 Carder (dental equip.)	58	.37
	712.887 Assembler (dental equip.)	58	.37
	WTG p. 479 CHILD AND ADULT CARE		
	355.878 Cottage Parent (medical ser.)	56	.26
OAP 58	WTG p. 276 CLASSIFYING, FILING AND RELATED WORK		
Q- 95	219.388 IBM Coder (clerical)	59	†
K- 90	WTG p. 280 COMPUTING AND RELATED RECORDING		
F- 75	210.388 Audit Clerk (clerical)	53	.41
	WTG p. 289 ROUTINE CHECKING AND RECORDING		
	209.688 Checker (clerical) II	59	†
	209.688 Sorter (clerical)	59	†
	231.588 Letter-Opener Operator (clerical)	59	†
	231.588 Mail Clerk (clerical)	59	†
	WTG p. 360 HANDLING		
	230.887 Inserter (clerical)	59	†
	729.887 Assembler, Accessories (elec. equip.)	55	.01
	922.887 Order Filler (any ind.)	51	†
OAP 59	WTG p. 271 INSPECTING AND STOCK CHECKING		
Q- 90	726.384 Inspector, Subassemblies (electronics)	51	†
F- 80 M- 85	WTG p. 282 SORTING, INSPECTING, MEASURING, AND RELATED WORK		
	920.687 Linen-Supply-Load Builder (laund.)	50	.33
	WTG p. 322 MANIPULATING		
	724.884 Coil Winder (elec. equip.) II	65	.47

***Table 11–1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 59	WTG p. 447 TENDING		
(cont.)	920.885 Napkin Packager (paper goods)	69	.62
OAP 60	WTG p. 319 PRECISION WORK		
Q– 85	363.781 Silk Finisher (clean., dye., & press.)	93	.40
K– 80	WTG p. 322 MANIPULATING		
M– 90	363.884 Presser, Hand (any ind.)	93	.40
	WTG p. 360 HANDLING		
	753.887 Assembler (rubber goods) II	50	†
	920.887 Packer (glass mfg.)	58	†
	WTG p. 435 OPERATING-CONTROLLING		
	557.782 Extruder Operator (fabric, plastics prod.; plastics mat.)	57	.30
	643.782 Corrugator Operator (paper goods)	70	.21
OAP 61	WTG p. 282 SORTING, INSPECTING, MEASURING AND RELATED WORK		
K– 90			
F– 85	224.487 Weigher (clerical) II	50	.26
M– 90	529.687 Asparagus Sorter (agric., can. & preserv.; whole. tr.)	136	.20
	715.687 Final Inspector, Movement Assembly (clock & watch)	60	.53
	715.687 Inspector, Casing (clock & watch)	60	.53
	WTG p. 322 MANIPULATING		
	713.884 Goggle-Glass Cutter (optical goods)	50	.40
	713.884 Lens Cutter (optical goods) II	50	.40
	715.884 Caser (clock & watch)	60	.53
	715.884 Dialer (clock & watch)	60	.53
	715.884 Hands Assembler (clock & watch)	60	.53
	720.884 Radio-Receiver Assembler (electronics)	59	†
	721.884 Electric-Motor Assembler (elec. equip.)	60	.31
	722.884 Assembler, Radiosonde (electronics)	57	.24
	755.884 Assembler, Microwave Tube (electronics)	60	†
	731.884 Assembler (toys & games)	140	.42
	731.884 Model-Airplane Assembler (toys & games)	140	.42
	731.884 Toy-Train Assembler (toys & games)	140	.42
	739.884 Case Coverer (jewelry cases; leather prod.)	50	.45
	739.884 Case Liner (jewelry cases; leather prod.)	50	.45
	739.884 Metal-Chair Assembler (furn.)	52	.44
	739.884 Venetian-Blind Assembler (window shade & fix.)	66	.35
	774.884 Stacker (pottery & porc.)	53	.22
	782.884 Embroiderer, Hand (garment; hosiery; knit goods; trim. & stamp. art goods)	33	.42

Table 11-1. Validity of Norms for Occupational Aptitude Patterns—Continued.

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 61	WTG p. 360 HANDLING		
(cont.)	529.887 Casing Tier (slaught. & meat pack.)	50	.39
	529.887 Skin Peeler (slaught. & meat pack.)	50	.39
	715.887 Liner-And-Gasket Inserter (clock & watch)	60	.53
	715.887 Lint Remover (clock & watch)	60	.53
	715.887 Sweep-Spring Attacher (clock & watch)	60	.53
	737.887 Fireworks Assembler (fireworks)	75	.39
	788.887 Cementer, Hand (boot & shoe)	54	.38
	920.887 Bagger (agric.; whole. tr.)	50	.26
	920.887 Bag Sealer (agric.; whole. tr.)	50	.26
	920.887 Cheese Wrapper and Packer (dairy prod.)	61	.34
	920.887 Packer, Sausage And Weiner (slaught. & meat pack.)	50	.39
	920.887 Scaler, Sliced Bacon (slaught. & meat pack.)	50	.39
	920.887 Table Worker (drug prep. & rel. prod.)	46	.21
	920.887 Tamale Packer (slaught. & meat pack.)	50	.39
	WTG p. 435 OPERATING-CONTROLLING		
	787.782 Seamer (hosiery)	200	.27
	WTG p. 447 TENDING		
	525.885 Meat Packaging Occupations, Selected (slaught. & meat pack.)	50	.39
	619.885 Machine Attendant (hardware)	50	.47
	692.885 Light-Bulb Assembler (elec. equip.)	50	.33
	723.885 Appliance-Cord Assembler (elec. equip.)	56	.36
	920.885 Packager, Solutions and Syringes (drug prep. & rel. prod.)	32	.31
OAP 62	WTG p. 322 MANIPULATING		
K- 80	706.884 Luggage-Hardware Assembler (hardware)	51	.31
F- 75	723.884 Electric-Fan Assembler (elec. equip.)	44	.24
M- 75	726.884 Crystal Finisher (electronics)	44	.44
	WTG p. 356 FEEDING-OFFBEARING		
	529.886 Cannery Worker (can. & preserv.)	410	.32
	529.886 Cutter, Machine (can. & preserv.)	194	.39
	529.886 Corn-Cutting-Machine Operator	194	.39
	529.886 Corn-Husking-Machine Operator	194	.39
	529.886 Sorter (can. & preserv.)	410	.32
	529.886 Trimmer (can. & preserv.)	410	.32
	529.886 Onion Corer (can. & preserv.)	61	.17
	683.886 Battery Loader (textile)	48	.36
	819.886 Spot-Welder Feeder (welding)	50	.33
	WTG p. 360 HANDLING		
	521.887 Stemmer, Hand (tobacco)	50	.30
	525.887 Poultry-Dressing Worker (slaught. & meat pack.)	72	.19
	529.887 Cutter, Hand (can. & preserv.)	410	.32
	725.887 Threader (electronics)	62	.57
	727.887 Assembler, Dry Cell And Battery	94	.51
	789.887 Garment Folder (garment; knit goods)	55	.42
	920.887 Candy Packer (confection)	75	.21

***Table 11–1. Validity of Norms for Occupational Aptitude Patterns*—Continued.**

Occupational Aptitude Pattern	Occupation and Code	N	φ
OAP 62	WTG p. 435 OPERATING-CONTROLLING		
(cont.)	363.782 Presser, Machine (any ind.)	51	.20
	WTG p. 447 TENDING		
	521.885 Stemmer, Machine (tobacco)	71	.22
	556.885 Compression-Molding-Machine Tender (fabrics, plastics prod.)	56	.43
	589.885 Boarding-Machine Operator	103	†
	660.885 Slubber Tender (woodworking)	31	.30
	680.885 Card Tender (asbestos prod.; textile)	53	†
	681.885 Yarn Winder (any ind.)	64	.21
	682.885 Spinner, Ring Frame (textile)	60	.22
	689.885 Braiding-Machine Operator (asbestos prod.; narrow fabrics)	51	.21
	692.885 Baser (elec. equip.)	62	.57
	920.885 Container-Maker-Filler-Packer Operator (any ind.)	53	.31

12. Relationship of Aptitudes to College Success

The General Aptitude Test Battery is used in the counseling process for various groups of counselees. One of these groups is high school seniors who will shortly either enter the labor market or seek additional academic training for various professional occupations. Successful completion of academic training is usually a prerequisite to entering such professional fields as medicine, engineering, or education. Therefore, when the counseling process involves considering plans for an individual to prepare for a professional field of work, the counselee's potentialities for successfully completing the required academic training should be determined. The GATB can be a valuable aid in making this determination if the relationships between performance on the GATB and success in various fields are known. The data presented in this chapter demonstrate some of these relationships.

SELECTION OF EXPERIMENTAL DESIGN

Ideally, the relationships between GATB test performance and academic success would be determined with an experimental design such as the following:

1. Test groups of high school students with the GATB, but do not rely on the test results for screening or counseling with respect to entering college.

2. Follow up individuals in the sample after high school graduation to determine which entered college and identify those who become academic failures and did not graduate. Process the data statistically to obtain correlations and other measures to indicate the validity of aptitudes of the GATB for predicting academic failure in college.

3. Group individuals in the sample into subsamples according to areas of specialization. Obtain complete data on courses taken and grades received. Process the data statistically to obtain correlations and other measures to indicate the relationships between GATB performance and academic success in each area of specialization.

4. Follow up the graduates after they have become employed. Determine whether they have entered work in the area of their college specialization, and obtain measures of their performance on the jobs they hold. Process the data statistically to obtain correlations and other measures to indicate the relationships between GATB performance in high school and success in occupations entered after college training.

The experimental design outlined above parallels the manner in which tests are used in the counseling process with high school seniors considering attending college. Tests are used to predict the individual's general ability to do college level work, his success in specific course areas in which he is especially interested, and his success on jobs for which his college work prepares him.

The U.S. Training and Employment Service, with the cooperation of its affiliated State employment security agencies, is conducting a long-term research project with an experimental design similar to that outlined above. (See Chapter 20 of this Section.) A sample of more than 36,000 high school students in Grades 9–12 was tested initially in 1958. In the college phase of the study individuals who enter colleges are being followed up two years after high school graduation to identify early academic failures and again seven years after high school graduation to obtain complete college records and ratings of performance on jobs obtained subsequent to college graduation.

Although it is highly desirable to conduct research studies using an experimental design like the one outlined above, practical limitations often preclude the use of such a design.

Many of the test research studies in academic areas are conducted by graduate students as thesis projects to meet requirements for graduate degrees in the field of psychology. Understandably, the students prefer to use an experimental design which involves less time than the many years required to test high school students and subsequently obtain data on their college achievement and performance in jobs after graduation. Even when graduate students are willing to spend years to complete their experimental studies, there are difficulties in keeping track of the sample after high school graduation to obtain criterion data and final samples that are homogeneous with regard to area of specialization, of sufficient size for statistical analysis, and comparable with respect to criterion data.

Because of the practical difficulties in the use of the longitudinal design, some alternative technique is usually employed. This sometimes involves testing a particular college group, such as juniors or seniors majoring in a given field, and using college grades available at the time of testing as the criterion. Although studies of this type yield measures of concurrent rather than predictive validity, they are nevertheless useful in determining relationships between test performance and academic success. However, validity coefficients for test scores of college samples tend to be depressed because of the restricted range of ability. A practical approach to the use of the longitudinal design is to test freshmen, sophomores, or juniors and correlate the test scores with college grades that these students make as seniors in their major course of study. Studies of this type will yield correlation coefficients that are measures of predictive validity, although these validity coefficients will not have quite the same meaning as those based on the test performance of samples of high school students correlated with measures of their subsequent college achievement.

SUMMARY OF RESULTS BY TYPE OF COLLEGE

This section summarizes the results from a number of the studies that have been conducted to determine the realtionship between the GATB and academic success in various courses of study in college. College success has also been used as a criterion in other studies conducted to develop GATB norms for other occupations which require college training. (See Chapter 9 of this Section.) The studies in this chapter are described individually in greater detail in the following section. The data shown for most studies include means and standard deviations of the aptitude scores and coefficients of correlation between aptitude scores and grade point averages. The GATB aptitude scores are expressed in terms of a standardized distribution for the GATB General Working Population Sample with a mean of 100 and a standard deviation of 20. (See Chapter 5 of this Section.) The relative importance of the aptitudes in any given sample is indicated not only by the correlation coefficients, but also by the profiles of mean aptitude scores and standard deviations. The fact that a sample has markedly higher mean scores on some aptitudes than on others is some indication of abilities that are important for that sample. Homogeneity of performance, indicated by relatively small standard deviations, also suggests important aptitudes. Data have been analyzed in terms of combinations of these descriptive characteristics to develop aptitude patterns of value in determining a counselee's potential for successfully completing the academic training required to enter various professional fields of work.

The results in the next section show that significant correlations with criteria of academic success have been obtained most frequently for Aptitudes G (Intelligence), V (Verbal Aptitude), and N (Numerical Aptitude). The correlations obtained for these aptitudes also tend to be higher than validity coefficients obtained for the other aptitudes, with Aptitude G usually showing the highest validity coefficient. The same pattern occurs with the mean aptitude scores—Aptitudes G, V, and N exhibit higher mean socres than the other aptitudes, with the highest mean score obtained most frequently for Aptitude G. The college samples also have greater homogeneity on Aptitudes G, V, and N than on the other aptitudes, with the lowest standard deviation obtained most frequently on Aptitude N. There is some variation in performance level among samples majoring in the same academic areas in different universities. However, there tend to be greater variations in aptitude performance level among samples specializing in different academic areas at the same university than among samples in the same academic areas at different universities. The degree of similarity in the aptitude profiles for a given area of academic specialization for samples from different colleges warrants the establishment of educational aptitude patterns.

GATB norms, which are helpful in the counseling process, have been established for a number of professional fields, such as engineering, dentistry, nursing, and teaching. (See Chapters 9 and 11 of this Section.) Performance on the GATB can be readily integrated for consideration in the counseling process when the counselee's interests and related pertinent factors point toward a specific professional field for which GATB test norms have been established. However, all too often, the vocational aspirations of a counselee who is contemplating college entrance are not so clear-cut and, frequently, the question of the counselee is, "Should I go to college or not?" Therefore, in addition to the use of GATB norms for specific professional fields, counselors would find some predictor of college success helpful in counseling high school students.

The best single GATB measure for predicting college success is Aptitude G. Aptitude G consistently shows significant correlations with criteria of academic success in a variety of academic fields, and tends to have higher validity coefficients than the other aptitudes. Inspection of the profiles of mean aptitude scores of college samples also makes the importance of Aptitude G apparent.

If we are to use Aptitude G as a predictor of college success, we need to establish cutting scores which differentiate effectively between those most likely to succeed and those most likely to fail in college. More than one cutting score on Aptitude G is needed because of the variety of colleges. A review of the college samples for which GATB results have been obtained indicates that the various colleges can be classified into the following three broad groupings:

1. Junior college—those colleges in which a certificate or degree is granted after two years of study;
2. Four-year college—those colleges offering courses which usually lead to a bachelor's degree after four years of study;
3. Professional college—those colleges offering highly specialized professional courses such as medicine, dentistry, and engineering.

When a test development study is conducted on a particular sample, minimum scores on aptitudes included in the test norms are usually set at five-point score levels that are approximately one standard deviation unit below the sample mean of each aptitude. (See Chapter 8 of this Section.) It has been found that good selective efficiency is usually obtained when the level of one standard deviation below the sample mean is used as a guide in setting minimum scores. Therefore, this approach was employed to establish critical scores to be used as predictors of college success. For each college grouping the mean and standard deviation of Aptitude G were computed for the combination of samples that were placed in that grouping. The results obtained for each group follow. Note that the analyses were based on data from the B-1001 edition before its 1966 modification to equate the B-1001 and B-1002 editions with regard to tests included and standardization population. (See Chapter 7 of this Section.)

Junior College

This group consists of 227 students enrolled in various junior college courses of study at Stephens College, Columbia, Missouri, and at the University of Minnesota. The samples included in this group are as follows:

Course of Study	*N*	*School*
Airline Traffic . .	61	Stephens College
Dental Hygiene .	83	University of Minnesota
Nursery School Teaching	83	Stephens College

A mean of 118.0 and a standard deviation of 13.5 on Aptitude G of the GATB, B–1001, were obtained for the combined sample of 227 students. The recommended critical score for these two groups on Aptitude G is 100.

Four-year College

This group consists of 771 students majoring in various courses of study at 5 colleges. The samples included in this group are as follows:

Course of Study	*N*	*School*
Biological Science	52	University of Utah
Business	90	University of Utah
Education	123	University of Utah
Education	81	Florida State University
Nursing	46	University of Minnesota
Pharmacy	127	University of Tennesse
Pharmacy	101	University of Utah
Psychology	66	Pennsylvania State University
Social Science ...	85	University of Utah

A mean of 129.0 and a standard deviation of 14.7 on Aptitude G of the GATB, B–1001, were obtained for the combined sample of 771 students. The recommended critical score on Aptitude G is 110.

Professional College

This group consists of 438 students enrolled in various specialized professional courses at 4 universities. The samples included in this group are as follows:

Course of Study	*N*	*School*
Architecture	51	University of Florida
Dentistry	96	University of Minnesota
Engineering	150	University of Tennessee
Engineeering ...	92	University of Utah
Medicine	49	University of Utah

A mean of 138.6 and a standard deviation of 12.2 on Aptitude G of the GATB, 8–1001, were obtained for the combined sample of 438 students. The recommended critical score on Aptitude G is 120.

Critical Scores

To summarize, the critical scores for the three groups of colleges are as follows:

Type of College	*Critical Score*
Junior College	G–100
Four-year College	G–110
Professional College	G–120

When considering a specific field of study, the counselor should always use the GATB norms that have been developed specifically for that field (see Sections II and IV of the *Manual for the GATB*) rather than one of the above critical scores.

RESULTS FOR INDIVIDUAL STUDIES

This section presents additional information on the samples used to develop Aptitude G cutting scores. Two additional studies present correlations of aptitude scores with grades in four course areas and with first-quarter grade point averages. One additional study presents correlations of aptitude scores with cumulative grade point averages in six course areas.

Stephens College—Airline Traffic and Nursery School Teaching

The GATB, B–1001, was administered to two samples of female graduating students in two-year programs at Stephens College, Columbia, Missouri. The first sample consists of 61 graduates in airline traffic, and the second sample consists of 83 graduates in nursery school education. The criterion for both samples consists of total grade point averages for the two years of course work and was used to compute coefficients of concurrent validity.

Table 12–1 shows means, standard deviations, and validity coefficients for all aptitudes. Mean scores of the airline traffic sample are markedly greater than means of the nursery school teaching sample on most aptitudes. Five aptitudes have significant correlations with the criterion for both samples.

Table 12–1. Means (M), Standard Deviations (σ), and Validity Coefficients (r) of GATB, B–1001, Aptitude Scores of Students in Airline Traffic and Nursery School Teaching Certification Areas at Stephens College, Columbia, Missouri

Aptitude	Airline Traffic N=61			Nursery School Teaching N=83		
	M	σ	r	M	σ	r
G—Intelligence	121.2	12.6	.43**	109.2	11.9	.46**
V—Verbal Aptitude	119.0	13.0	.46**	112.9	12.0	.41**
N—Numerical Aptitude	115.0	13.0	.40**	103.4	13.9	.34**
S—Spatial Aptitude	113.1	14.9	.22	107.7	13.3	.26*
P—Form Perception	118.9	15.9	.27*	115.3	14.8	.28**
Q—Clerical Perception	116.1	15.3	.16	111.0	15.5	.20
A—Aiming	108.4	16.3	.17	110.4	15.5	.29**
T—Motor Speed	112.7	14.6	.34**	109.4	16.5	.33**
F—Finger Dexterity	121.5	19.9	.20	115.0	17.0	.24*
M—Manual Dexterity	103.3	27.1	.21	89.5	19.1	.27*

*Significant at the .05 level.

**Significant at the .01 level.

Note.—N=82 for the nursery school teaching sample on Aptitudes F and M.

University of Minnesota—Dental Hygiene

These results are from a study conducted by the Minnesota employment security agency in 1952 to develop a national battery for the occupation of Dental Hygienist 078.368. The sample consists of 52 first-year and 31 second-year female students enrolled in the two-year dental hygiene course at the University of Minnesota. The sample was tested with B–1001. The criterion consists of grade point averages for course work in the first year of the two-year course and was used to compute coefficients of predictive validity.

Table 12–2 shows means, standard deviations, and validity coefficients for all aptitudes. Aptitudes G, V, N, S, and P are significantly related to the criterion.

Columbia Basin Community College—Vocational-Technical Areas

These results are from a study by Sullivan (1967). The sample consists of 275 students tested with the GATB, B–1002, between 1960 and 1966. All students were enrolled in two year vocational-technical programs and all had completed one or more quarters of academic work. The criterion consists of cumulative grade point averaged for all courses.

Table 12–2. Means (M), Standard Deviations (σ), and Validity Coefficients (r) of GATB, B–1001, Aptitude Scores of Students in Dental Hygiene Course at the University of Minnesota—N=83

Aptitude	M	σ	r
G—Intelligence	124.5	10.6	.48**
V—Verbal Aptitude	118.2	13.0	.24*
N—Numerical Aptitude	119.0	10.4	.27*
S—Spatial Aptitude	121.6	14.8	.44**
P—Form Perception	134.2	13.4	.45**
Q—Clerical Perception	127.3	13.8	.12
A—Aiming	128.0	16.0	.06
T—Motor Speed	118.8	14.5	.07
F—Finger Dexterity	122.8	17.9	.10
M—Manual Dexterity	117.7	18.4	—.04

*Significant at the .05 level.

**Significant at the .01 level.

Table 12–3 shows means, standard deviations, and validity coefficients for GATB, B–1002, aptitude scores for each of six areas.

University of Utah—Various Areas

This study was reported by the GATB Senior Project Staff of the University of Utah Department of Psychology (1951). The samples

Table 12–3. Means (M), Standard Deviations (σ) and Validity Coefficients (r) for GATB, B–1002, Aptitude Scores of Students Majoring in Various Vocational-Technical Areas at Columbia Basin Community College

Aptitude	Automotive Technology N=60	Distributive Education N=41	Electronics Technology N=58	Machine Technology N=33	Technical Illustration N=35	Welding Technology N=48
G—Intelligence						
M	104.9	107.0	116.2	107.5	111.8	101.9
σ	12.8	11.8	10.7	12.0	11.7	15.6
r	.42**	.23	.30*	.22	.34*	.26
V—Verbal Aptitude						
M	97.8	102.9	107.9	99.9	101.2	97.1
σ	12.0	10.5	10.6	11.6	16.4	15.3
r	.48**	.25	.15	.18	.40*	.26
N—Numerical Aptitude						
M	102.6	102.7	113.9	103.7	104.2	99.9
σ	14.6	11.4	12.4	11.4	13.7	16.1
r	.36**	.46**	.22	.24	.19	.10
S—Spatial Aptitude						
M	112.1	109.0	121.5	117.7	127.7	109.1
σ	18.5	21.2	17.5	16.8	12.8	20.3
r	.31*	−.21	.18	.05	.23	.26
P—Form Perception						
M	115.3	118.2	118.9	118.1	123.9	107.0
σ	15.9	17.7	15.3	18.0	16.7	19.1
r	.22	.09	.02	.05	.52**	.23
Q—Clerical Perception						
M	106.2	112.4	110.8	107.4	111.3	105.0
σ	12.8	14.2	14.2	12.9	12.8	13.7
r	.40**	.24	.16	.17	.42*	.20
K—Motor Coordination						
M	98.4	102.7	105.3	97.7	105.9	100.8
σ	13.4	17.7	17.8	17.0	18.2	16.5
r	.40**	.31*	.08	.26	.05	.06
F—Finger Dexterity						
M	101.5	98.4	99.5	99.5	98.6	94.2
σ	19.7	20.4	18.1	18.5	24.3	19.6
r	.18	.42**	−.03	.37*	.12	.18
M—Manual Dexterity						
M	111.0	105.9	111.7	114.2	108.3	108.7
σ	21.2	25.3	18.7	23.2	21.3	24.7
r	.30*	.18	−.12	.34*	.10	.09

*Significant at the .05 level.
**Significant at the .01 level.

Table 12–4. Means (M), Standard Deviations (σ), and Validity Coefficients (r) for GATB, B-1001, Aptitude Scores of Students Majoring in Various Areas of Study at the University of Utah

Aptitude	Biolog. Science Seniors N = 52	Business Seniors N = 90	Education Seniors N = 123	Engineer. Seniors N = 92	Social Science Seniors N = 85	Medical Soph. N = 49	Pharmacy Soph. N = 101
G—Intelligence:							
M	131.7	135.3	124.5	141.2	127.6	143.0	131.4
σ	15.9	14.0	14.6	12.3	17.3	12.0	12.8
r	.31*	.51**	.37**	.52**	.54**	.47**	.40**
V—Verbal Aptitude:							
M	128.6	126.7	123.8	127.2	129.6	137.6	119.9
σ	16.9	15.8	14.8	13.9	16.4	14.4	13.0
r	.41**	.61**	.34**	.35**	.53**	.45**	.32**
N—Numerical Aptitude:							
M	119.5	132.1	115.6	133.6	115.9	132.6	137.6
σ	13.9	13.5	14.4	10.4	18.0	12.8	15.0
r	.22	.37**	.35**	.35**	.45**	.39**	.32**
S—Spatial Aptitude:							
M	126.8	123.2	118.9	134.2	118.8	128.0	123.8
σ	17.2	15.9	14.3	15.9	18.2	10.7	17.0
r	.15	.20	.16	.25*	.20	.41**	.19
P—Form Perception:							
M	122.5	125.2	118.8	122.8	118.2	126.3	121.2
σ	14.9	14.1	17.3	15.5	18.0	13.7	14.0
r	.26	.09	.18*	.30**	.21*	.12	.14
Q—Clerical Perception:							
M	116.7	117.1	117.4	114.7	114.2	123.0	111.7
σ	16.4	16.1	15.0	17.0	19.0	20.0	16.0
r	.36**	.31**	.35**	.33**	.54**	.14	.26**
A—Aiming:							
M	114.8	118.4	119.6	118.2	114.5	107.2	117.6
σ	17.4	15.5	18.1	16.3	20.0	23.8	14.0
r	.26	.09	.03	.08	.25*	−.15	.17
T—Motor Speed:							
M	116.8	116.3	120.4	117.7	112.9	98.9	115.3
σ	16.6	25.5	16.5	18.9	19.8	25.5	15.0
r	.26	.13	.16	.04	.30**	.01	.15

*Significant at the .05 level.

**Significant at the .01 level.

consist of 442 seniors majoring in 5 areas (biological science, business, education, engineering, and social science), 49 second-year students in the College of Medicine, and 101 sophomores in the College of Pharmacy at the University of Utah. All samples were tested with the paper-and-pencil tests of B–1001. The criteria consist of overall grade point averages during four years. Criteria for the medical and pharmacy samples are based only on their specialized courses.

Table 12–4 shows means, standard deviations, and validity coefficients for all aptitudes for each sample. Note the wide variation in mean aptitude scores in the various fields. Aptitudes G and V are significantly related to the criterion for all seven samples; Aptitudes N and Q are significantly related to the criterion for six of the seven samples.

Florida State University—Education

These results are from a study by Grote (1951). The sample consists of 81 seniors majoring in education at Florida State University. It was one of the samples used in the development of a national battery for the occupations of Teacher, Elementary School 092.228 and Teacher, Secondary School 091.228. The sample was tested with the paper-and-pencil tests of B–1001. The tests measuring Aptitudes F and M were not administered. The criterion consists of grade point averages based on all courses taken during a minimum of seven and a maximum of nine college quarters. This criterion was used to compute coefficients of concurrent validity for each aptitude.

Table 12–5. Means (M), Standard Deviations (σ), and Validity Coefficients (r) of GATB, B–1001, Aptitude Scores of Students Majoring in Education at Florida State University—N=81

Aptitude	M	σ	r
G—Intelligence	124.3	14.5	.50**
V—Verbal Aptitude	125.4	15.5	.63**
N—Numerical Aptitude	115.3	14.1	.43**
S—Spatial Aptitude	109.3	15.1	.07
P—Form Perception	114.6	15.2	.38**
Q—Clerical Perception	116.0	16.2	.40**
A—Aiming	106.4	11.5	.11
T—Motor Speed	100.6	17.7	.21

**Significant at the .01 level.

Table 12–6. Means (M), Standard Deviations (σ), and Validity Coefficients (r) of GATB, B–1001, Aptitude Scores of Student Nurses at the University of Minnesota—N=46

Aptitude	M	σ	r
G—Intelligence	131.2	13.3	.62**
V—Verbal Aptitude	126.3	16.6	.44**
N—Numerical Aptitude	125.6	13.0	.43**
S—Spatial Aptitude	121.4	16.4	.38**
P—Form Perception	128.3	18.5	.42**
Q—Clerical Perception	130.6	16.8	.34*
A—Aiming	116.5	14.0	—.08
T—Motor Speed	118.0	16.1	.02
F—Finger Dexterity	114.3	18.6	.03
M—Manual Dexterity	108.2	20.0	.15

*Significant at the .05 level.
**Significant at the .01 level.

Table 12–5 shows means, standard deviations, and validity coefficients for the aptitudes measured by the tests administered. The mean aptitude scores of all aptitudes except A and T are quite similar to the means for the sample of education majors at the University of Utah described previously. Aptitudes G, V, N, P, and Q are significantly correlated with the criterion.

University of Minnesota—Nursing

This sample consists of 46 female freshmen students enrolled in the degree curriculum in basic professional nursing at the University of Minnesota. Students who successfully complete the four-year program receive a Bachelor of Science degree and are eligible to take the State Board examination for nurses. The sample was tested with the entire B–1001 during the first quarter of the basic professional nursing course. The criterion for the sample consists of grade point averages for the first three quarters of course work in the basic professional nursing curriculum. This criterion was used to compute coefficients of predictive validity for each aptitude.

Table 12–6 shows means, standard deviations, and validity coefficients for all aptitudes. Aptitudes G, V, N, S, P, and Q have significant correlations with the criterion.

University of Tennessee—Engineering and Pharmacy

These results are from a study by Enneis (1952) conducted with a sample of engineering students at the University of Tennessee and a study conducted by the Tennessee employment security agency with a sample of University of Tennessee pharmacy students. The sample of engineering majors includes 36 freshmen, 33 sophomores, 41 juniors, and 40 seniors who were tested with B–1001 during the spring quarter of 1952. The final pharmacy sample, which was used in the development of a national battery for the occupation of Pharmacist 074.181, includes 64 sophomores and 63 seniors who were tested with B–1001 in May, 1950. The initial sample included 134 students, but this number was reduced by those students who failed to graduate. The criterion of academic success for the engineering sample, used to compute coefficients of concurrent validity of the GATB, consists of grade point averages based on all courses completed by the end of the winter quarter of 1952. The number of courses varies, of course, among the students. The criterion for the sample of pharmacy majors consists of grade point averages based upon the full three-year pharmacy course, and was also used to compute coefficients of concurrent validity.

Table 12–7 shows means, standard deviations, and validity coefficients for these samples for all aptitudes. Mean aptitude scores for both Tennessee samples are similar to the means for the samples majoring in the same fields at the University of Utah in the study

Table 12–7. Means (M), Standard Deviations (σ), and Validity Coefficients (r) of GATB, B–1001, Aptitude Scores of Students Majoring in Engineering and Pharmacy at the University of Tennessee

Aptitude	Engineering Majors N=150			Pharmacy Majors N=127		
	M	σ	r	M	σ	r
G—Intelligence	137	13.1	.42**	126.2	12.4	.37**
V—Verbal Aptitude	121	15.3	.40**	113.1	14.5	.25**
N—Numerical Aptitude	129	12.4	.38**	125.9	12.7	.35**
S—Spatial Aptitude	134	14.7	.11	118.8	17.5	.19*
P—Form Perception	122	15.0	.11	118.9	16.9	.15
Q—Clerical Perception	110	16.8	.30**	111.9	15.5	.22*
A—Aiming	117	16.1	.20*	114.6	16.1	.16
T—Motor Speed	111	17.1	.25**	112.8	16.7	.16
F—Finger Dexterity	109	17.6	.08	103.0	17.1	.12
M—Manual Dexterity	114	17.6	.01	109.3	18.0	.20*

*Significant at the .05 level.
**Significant at the .01 level.
Note.—N=148 for the engineering sample on Aptitudes F and M.

Table 12–8. Means (M), Standard Deviations (σ), and Validity Coefficients (r) of GATB, B–1001, Aptitude Scores of Students Majoring in Psychology at Pennsylvania State University—N=66

Aptitude	M	σ	r
G—Intelligence	134.0	12.9	.52**
V—Verbal Aptitude	133.0	14.3	.41**
N—Numerical Aptitude	125.4	13.9	.35**
S—Spatial Aptitude	124.0	16.0	.28*
P—Form Perception	127.6	14.9	.20
Q—Clerical Perception	131.0	16.0	.24
A—Aiming	117.2	12.9	.09
T—Motor Speed	118.1	17.2	.02
F—Finger Dexterity	111.5	18.8	.18
M—Manual Dexterity	104.5	20.0	.07

*Significant at the .05 level.
**Significant at the .01 level.

cited earlier. The largest mean score difference between the Tennessee and Utah engineering samples is about six points on Aptitude V. Somewhat greater differences appear between mean scores of the 2 pharmacy samples on some aptitudes; the greatest difference is about 12 points on Aptitude N. Aptitudes G, V, N, and Q are significantly related to the criterion for both samples.

Pennsylvania State University—Psychology

These results are from a study conducted by the Pennsylvania employment security agency

Table 12–9. Means (M), Standard Deviations (σ), and Validity Coefficients (r) of GATB, B–1001, Aptitude Scores of Students Majoring in Architecture at the University of Florida—N=51

Aptitude	M	σ	r
G—Intelligence	134.6	10.7	.40**
V—Verbal Aptitude	118.9	12.4	.45**
N—Numerical Aptitude	125.0	10.7	.40**
S—Spatial Aptitude	139.6	16.3	.27
P—Form Perception	124.4	14.2	.09
Q—Clerical Perception	110.2	14.8	.22
A—Aiming	117.0	14.1	.07
T—Motor Speed	120.1	16.9	.14
F—Finger Dexterity	102.7	16.7	.17
M—Manual Dexterity	111.4	19.4	.13

**Significant at the .01 level.

Table 12–10. Means (M), Standard Deviations (σ), and Validity Coefficients for Criteria of Lecture Grades (r_1) and Laboratory Grades (r_2) of GATB, B–1001, Aptitude Scores of Students Majoring in Dentistry at the University of Minnesota

Aptitude	N=96			N=89
	M	σ	r_1	r_2
G—Intelligence	138.5	10.4	.24*	.13
V—Verbal Aptitude	123.0	13.0	.15*	.03
N—Numerical Aptitude	131.2	10.5	.20	—.06
S—Spatial Aptitude	136.7	14.5	.29**	.34**
P—Form Perception	122.7	13.7	—.02	.33**
Q—Clerical Perception	115.1	12.1	—.04	.05
A—Aiming	107.7	12.2	—.22*	.11
T—Motor Speed	107.6	15.5	—.23*	.06
F—Finger Dexterity	110.5	17.3	—.08	.24*
M—Manual Dexterity	114.2	15.6	—.18	.14

*Significant at the .05 level.
**Significant at the .01 level.

Table 12–11. Coefficients of Correlation Between GATB, B–1002, Aptitude Scores and Cumulative Grade Point Averages of Students Majoring in Various Areas of Study at Utah State University

Aptitude	Engineering N=47	Business Admin. N=33	Education N=61	Physical Education N=30
G—Intelligence	.44**	.55**	.23	.28
V—Verbal Aptitude	.40**	.59**	.41**	.24
N—Numerical Aptitude	.27	.40**	.10	.15
S—Spatial Aptitude	.34*	.11	.05	.39*
P—Form Perception	.36*	.25	.26*	.18
Q—Clerical Perception	—.11	.53**	.30*	.40*
K—Motor Coordination	.12	.34	.35**	.16
F—Finger Dexterity	.10	.30	.29*	.10
M—Manual Dexterity	.04	—.13	.06	.23

*Significant at the .05 level.
**Significant at the .01 level.

to develop a national battery for the occupation of Psychologist, General 045. The sample consists of 66 juniors and seniors majoring in psychology at Pennsylvania State University. Individuals in the sample were tested with B–1001 in March or November, 1950. The criterion consists of grade point averages for four basic psychology courses required of all psychology majors at the University. This criterion was used to compute coefficients of concurrent validity.

Table 12–8 shows the means, standard deviations, and validity coefficients for all aptitudes.

University of Florida—Architecture

These results are from a study by Thompson (1950) conducted with a sample of 51 seniors majoring in architecture at the University of Florida. The sample was tested with B–1001. The criterion consists of grade point averages based on upper division work in the architectural curriculum, and was used to compute coefficients of concurrent validity.

Table 12–9 shows means, standard deviations, and validity coefficients for all aptitudes. Aptitudes G, V, and N have significant correlations with the criterion.

University of Minnesota—Dentistry

This study was conducted by the Minnesota employment security agency. The sample is one of the two used to develop national norms for the occupation of Dentist 072.108. It consists of 96 freshmen (93 men and 3 women) entering the University of Minnesota School of Dentistry in 1950. The sample was tested with B–1001. Two criteria, each reflecting an im-

Table 12–12. Coefficients of Correlation Between GATB, B–1001, Aptitude Scores and First-Quarter Grade Point Averages of Freshmen Students Entering the University of Utah in 1948

Aptitude	Male Students N=776	Female Students N=515
G—Intelligence	.43**	.41**
V—Verbal Aptitude	.43**	.34**
N—Numerical Aptitude	.37**	.30**
S—Spatial Aptitude	.20**	.17**
Q—Clerical Perception	.27**	.40**

**Significant at the .01 level.

Table 12–13. Means (M), Standard Deviations (σ), and Validity Coefficients (r) for GATB, B-1001, Aptitude Scores of Students Majoring in Various Areas of Study at North Texas State College

Aptitudes		Accounting $N_1 = 42$ $N_2 = 42$	Business Ed. $N_1 = 50$ $N_2 = 50$	Elementary Ed. $N_1 = 44$ $N_2 = 44$	Industrial Arts $N_1 = 50$ $N_2 = 50$	Marketing $N_1 = 42$ $N_2 = 42$
G—Intelligence	M_1	130	119	116	119	124
	M_2	133	125	114	121	123
	σ_1	14.0	13.0	14.7	13.4	15.6
	σ_2	15.5	13.0	14.2	13.0	11.8
	r_1	.136	.340*	.319*	.206	.348*
	r_2	.503**	.539**	.539**	.324*	.391*
V—Verbal Aptitude	M_1	115	110	113	105	109
	M_2	115	114	110	104	111
	σ_1	13.3	11.3	11.5	13.5	12.8
	σ_2	18.0	14.4	16.6	13.0	14.1
	r_1	.349*	.245	.304*	.196	.406**
	r_2	.372*	.577**	.610**	.118	.299
N—Numerical Aptitude	M_1	134	124	109	112	109
	M_2	136	125	112	114	124
	σ_1	11.6	13.4	15.9	13.0	12.8
	σ_2	10.8	10.8	14.3	15.0	10.1
	r_1	.079	.251	.343*	.184	.455**
	r_2	.538**	.401**	.571**	.342*	.417**
S—Spatial Aptitude	M_1	121	110	118	131	121
	M_2	123	117	113	132	119
	σ_1	19.4	16.6	17.4	14.7	18.2
	σ_2	15.4	15.5	14.8	15.8	16.2
	r_1	−.070	.322*	.044	.100	.295
	r_2	.244	.112	.009	.284*	.061
P—Form Perception	M_1	121	121	123	120	123
	M_2	118	124	122	113	120
	σ_1	17.1	16.0	18.2	20.8	15.2
	σ_2	25.0	19.0	17.3	14.0	17.5
	r_1	.068	.071	.182	.123	.215
	r_2	.061	−.036	.076	.048	.183
Q—Clerical Perception	M_1	114	121	120	102	107
	M_2	113	123	115	97	111
	σ_1	16.0	18.0	13.9	15.6	12.8
	σ_2	14.1	15.9	14.3	11.2	13.6
	r_2	.322*	.210	.074	.156	.267
	r_1	.175	.215	.289	−.047	.380*

*Significant at the .05 level.

**Significant at the .01 level.

portant aspect of academic performance, were obtained. They consist of grade point averages at the end of the first year in Dental School for (1) lecture courses, and (2) laboratory courses. The averages for laboratory courses were available for only 89 of the 96 students. Coefficients of concurrent validity were computed for each of these criteria.

Table 12–14. Means (M), Standard Deviation (σ), and Validity Coefficients (r) of GATB, B–1001, Aptitude Scores of Students Principally Enrolled in the School of Business at Indiana University—N=1079

Aptitudes	M	σ	r
G—Intelligence	134.3	12.2	.36**
V—Verbal Aptitude	124.9	13.1	.36**
N—Numerical Aptitude	133.8	14.3	.36**
S—Spatial Aptitude	120.7	16.7	.11**
P—Form Perception	121.0	15.6	.05
Q—Clerical Perception	121.4	16.3	.19**
A—Aiming	111.7	15.6	.10**
T—Motor Speed	113.8	16.6	.09**

**Significant at the .01 level.

Table 12–10 shows means, standard deviations, and validity coefficients for all aptitudes. Only Aptitude S has a significant correlation with both criteria; several other aptitudes have significant correlations with one criterion but not with the other.

Utah State University—Various Areas

These results are from a study by Pickett (1958). The four samples consist of 171 students, including 102 males and 69 females, majoring in engineering, business administration, education, and physical education. These students were tested with the GATB, B–1002, in 1953 while they were juniors or seniors in high school. The criterion consists of cumulative grade point averages based on all courses taken through the junior or senior year at Utah State University. Criterion data were

Table 12–15. Validity Coefficients of GATB, B–1001, Aptitude Scores of Students Majoring in Various Areas of the School of Business and a Group of Students in the College of Arts and Science at Indiana University

Majors	N	Aptitudes of the GATB							
		G	V	N	S	P	Q	A	T
Marketing	411	.25**	.25**	.29**	.09	.04	.15**	.10*	.08
Business Statistics Accounting	233	.42**	.39**	.37**	.03	.08	.23**	.11	.11
Management	167	.34**	.34**	.35**	.18*	.03	.12	.16*	.10
General Business	110	.18	.12	.23*	.10	.03	.04	.08	.15
Secretarial Training Business Education	35	.48**	.41*	.36*	.34	.22	.09	.20	.14
Insurance Public Business Adm. Real Estate	37	.43**	.42**	.26	.10	—.02	−.00	−.08	−.10
Arts and Science	49	.32*	.25	.35*	.27	.14	.25	.04	.24

*Significant at the .05 level.
**Significant at the .01 level.

collected in 1957. This criterion was used to compute coefficients of predictive validity.

Table 12–11 shows validity coefficients for all aptitudes for each sample. Means and standard deviations of the aptitude scores are not available. The patterns of significant correlations for these samples resemble the patterns for samples of students majoring in the same areas in other universities.

University of Utah—Grade Point Averages for All Subjects

These results are from a study by Jex and Sorenson (1953). The sample consists of 776 male and 515 female students tested when they entered the University of Utah in 1948. The students took only the tests of B–1001 which measure Aptitudes G, V, N, S, and Q. The criterion consists of first-quarter grade point averages for all subjects. This criterion was used to compute coefficients of predictive validity.

Table 12–12 shows validity coefficients for the aptitudes measured by the tests administered. Means and standard deviations of the aptitude scores are not available. All of the tested aptitudes have significant correlations with the criterion, for both men and women. The authors interpret these findings as follows:

"... It is interesting to note, however, that on a substantial population some of the r's are not only statistically significant but comparatively large. The G score compares favorably with the total score on the American Council on Education Psychological Examination in predicting first-quarter grades at the University of Utah. (The correlation between total score on the ACE and first-quarter grades at the University of Utah in several studies has been respectively .44, .42, and .38.) This finding is rather remarkable when it is considered that a 17-minute test is being compared with a 38-minute test. Furthermore, it is quite possible that if individual tests are combined for this particular purpose a Multiple R significantly larger than that between G and grade point average can be obtained. . . ."

North Texas State College—Various Areas

These results are from a study by Nicksick (1957). The sample consists of 456 students who were tested with the GATB, B–1001 as freshmen or sophomores and who graduated during the period 1952–56. They were grouped according to fields of study, divided into two equal samples and a separate analysis was done on each sample. The criterion consists of grade point averages for courses in major fields taken during each student's college career.

Table 12–13 shows means, standard deviations, and validity coefficients for GATB, B–1001, aptitude scores.

Indiana University—School of Business

The results in Tables 12–14 and 12–15 are from a study by Gibson (1951). The total sample consists of 1079 students, 1016 enrolled in the School of Business and 63 enrolled in other schools at the Indiana University. The GATB, B–1001, was administered in 1948 to 972 first semester seniors, 101 second semester juniors and 6 graduate students. The criterion consists of grade point averages for all courses taken at the university prior to the first semester of the academic year 1948–49.

Table 12–14 shows the means, standard deviations, and validity coefficients of the GATB, B–1001, Aptitudes G, V, N, S, P, Q, A and T for the total sample.

Table 12–15 shows the validity coefficients for the same aptitudes for 993 business students, by majors, and 49 students in the College of Arts and Science. Because of the small number of students in other majors, validity coefficients were not computed for 37 students.

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13. Effectiveness of Tests in Selection and Counseling

After test norms have been established for a specific occupation and for families of occupations (see Chapters 8 and 10 of this Section), studies are conducted to evaluate the effectiveness of the test norms in actual use. Data are obtained to determine (1) the contribution of test results to the selection process in the hiring of new workers, and (2) the advantages to both the individual and the employer when test results have been used in counseling.

This chapter describes research to evaluate the effectiveness of USTES tests in the operational setting. Results show that use of tests adds to quality of placement and contributes to desirable counseling outcomes. However, a really adequate evaluation requires a broadly based, systematic, and continuing followup of applicants to obtain information on employment and measures of training and on-the-job success. These measures, transformed into monetary units, could be used as criteria against which the benefits from using tests are determined. The final step in a complete evaluation requires comparison of benefits derived from testing with the costs of using them in a variety of circumstances.

The most direct way of evaluating a new production technique is to determine its effects on quality and quantity of the product. The principle is the same when the technique is a selection or counseling tool and the setting is Employment Service operations. A meaningful evaluation of the technique can be made by a study of change in quality of service to applicants and employers resulting from use of the tool by Employment Service personnel. For example, the effectiveness of an aptitude test battery for a specific occupation can be determined by measurement of differences in job success of those who pass and those who fail the test battery. Similarly, evidence of the effectiveness of the GATB in counseling can be obtained through followup studies in which a comparison is made of job success and satisfaction of individuals counseled with the GATB and individuals counseled without the GATB. Such studies provide direct and concrete evidence of the effect that use of testing tools has on quality of Employment Service operations.

EFFECTIVENESS OF GATB NORMS FOR SELECTION

To conduct a study on effectiveness of norms for a specific occupation, test results are used in the selection of applicants for referral to an employer and then the subsequent job success of these new workers (test-selected workers) is compared with the job success of other workers in the same plant who were not hired on the basis of test results (non-test-selected workers). For example, Figure 13–1 shows comparisons with respect to job success between Sewing-Machine Operators (N=30) selected with Aptitude Test Battery S–4 and non-test-selected Sewing-Machine Operators (N=30) referred by the Kansas State Employment Service to the same factory. The test-selected and non-test-selected groups of workers were comparable with respect to age and education, and the same hiring specifications, except for the S–4 norms, were used for both groups. After the company's performance standards were applied, it was found that among the group of test-selected workers the ratio of successful to unsuccessful workers was about 9 to 1, but among the group of non-test-selected workers less than half of the workers were successful.

Figure 13–2 shows comparisons with respect to training course success between Key-Punch Operator trainees (N=59) selected with Aptitude Test Battery S–180 and non-test-selected Key-Punch Operator trainees (N=49) referred by the Michigan State Employment Service to the same training center. A comparison of the level of performance of

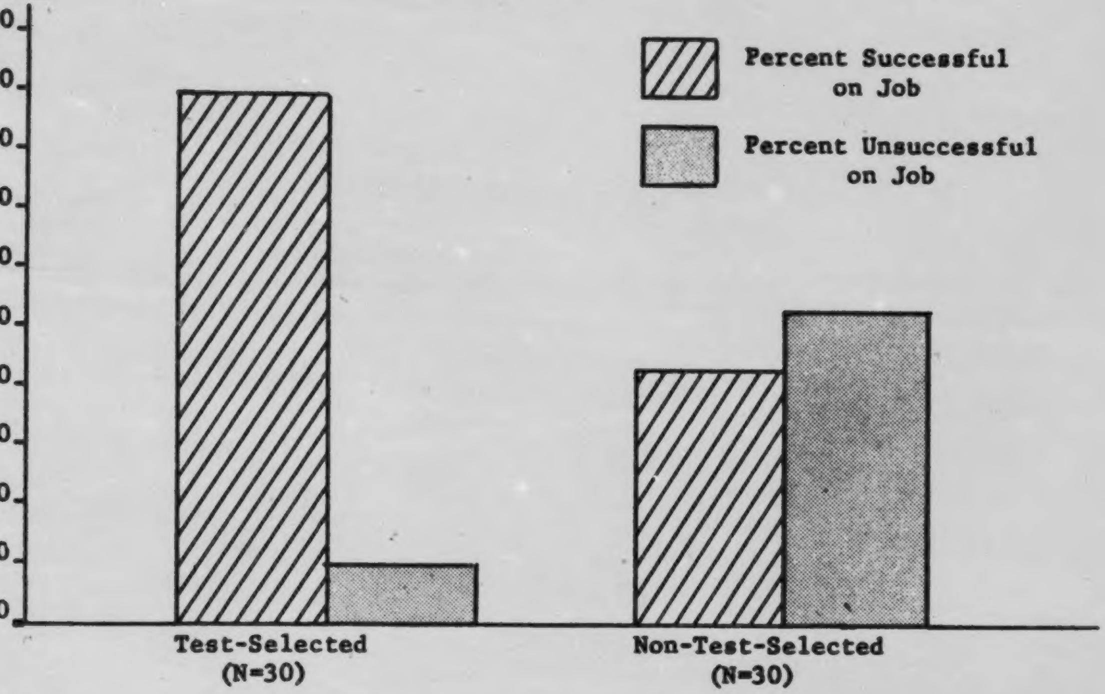

Fig. 13–1. Comparisons between test-selected and non-test-selected Sewing-Machine Operators with respect to success on the job.

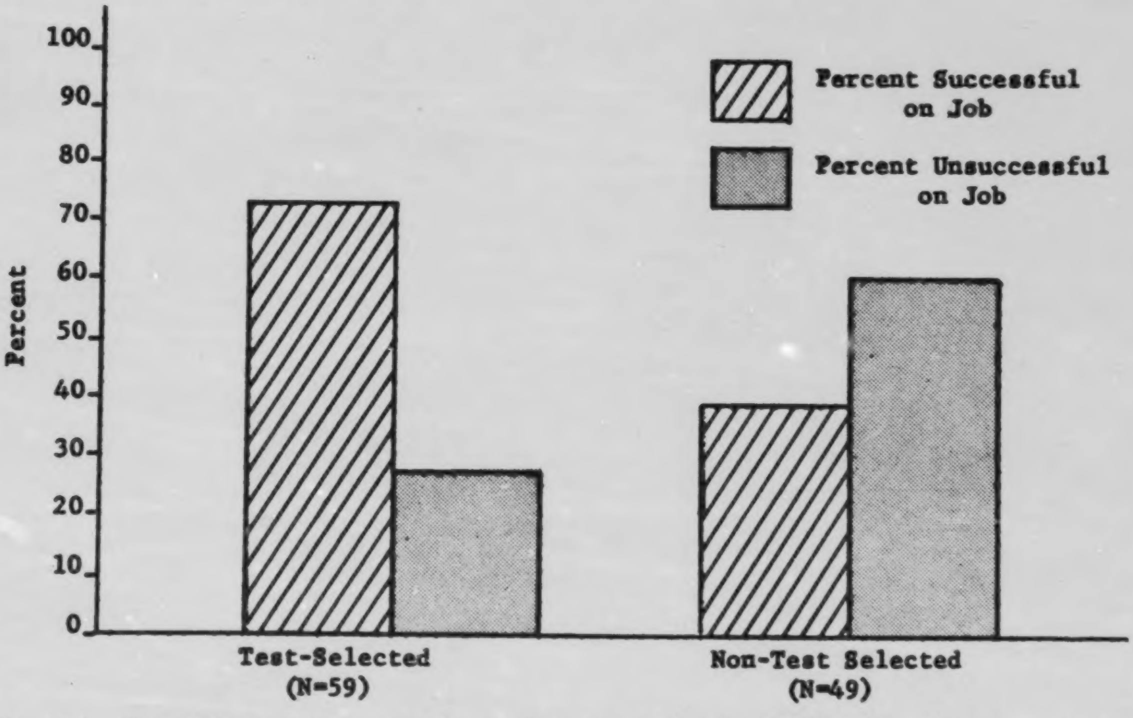

Fig. 13–2. Comparisons between test-selected and non-test-selected Key-Punch Operator trainees with respect to training course success.

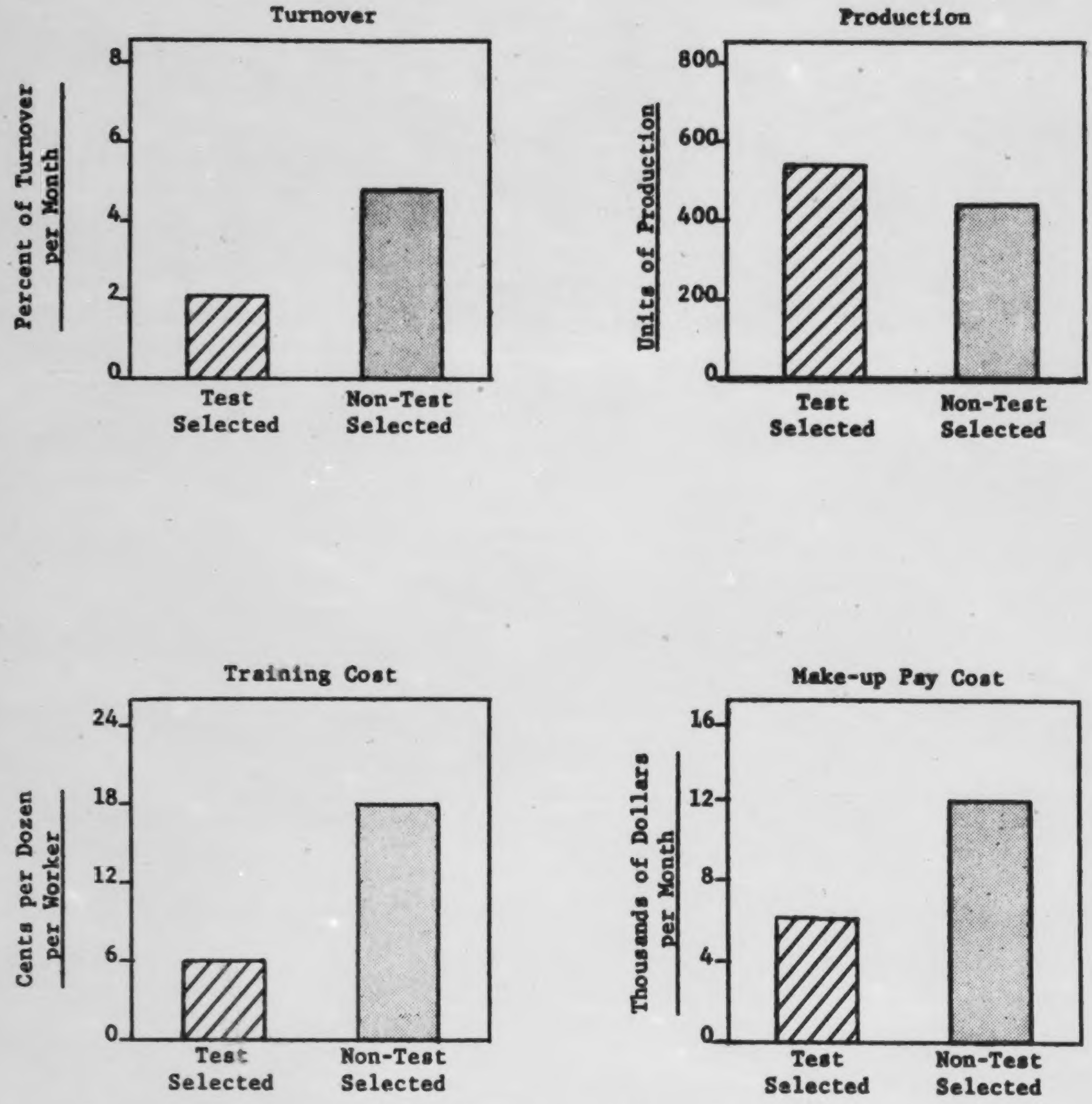

Fig. 13–3. Comparisons between test-selected and non-test-selected Power-Sewing-Machine Operators with respect to turnover, production, training cost, and make-up pay cost.

the trainees showed that among the test-selected group the ratio of successful to unsuccessful trainees was approximately 3 to 1, but among the non-test-selected group less than half of the trainees were successful.

Figure 13–3 shows comparisons with respect to turnover, production, training cost, and make-up pay cost between test-selected and non-test-selected Power-Sewing-Machine Operators working for the same employer. The results indicate that for the test-selected workers there is less turnover, higher production, lower training cost, and less make-up pay cost.

Figure 13–4 shows comparisons with re-

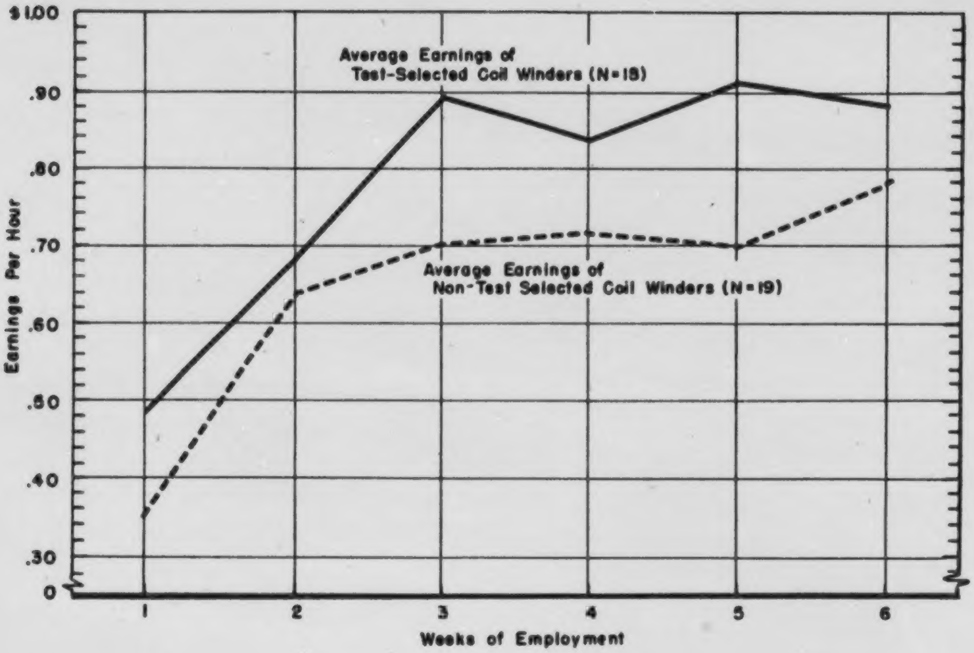

Fig. 13–4. Comparisons between test-selected and non-test-selected Coil Winders with respect to average hourly earnings during training.

spect to average hourly earnings during training between test-selected Coil Winders (N = 18) and non-test-selected Coil Winders (N = 19) employed by the same company. All data cover the same period of time in the same department and plant. The employer considers four to six weeks as the normal training period for this job. The results show that for any period of time during the six-week training period the group of test-selected workers averaged more earnings per hour than the group of non-test-selected workers. Furthermore, the group of non-test-selected workers did not produce at a rate to warrant the minimum hourly wage when the study was conducted (75¢ per hour) until the end of the last week of the six-week training period, whereas the group of test-selected workers produced at a rate above the minimum wage level after approximately 2½ weeks of training.

In 1970 the Minnesota agency completed a follow-up study of applicants referred to 18 courses offered under the Manpower Development Training Act in seven locations within the State. The study involved 278 individuals, some of whom were Negroes, Indians or Spanish Americans. The individuals were all tested with the entire GATB prior to referral to training and instructors' ratings were obtained after completion of training. Specific Aptitude Test Batteries were available for the occupations involved in each of these training courses but the evidence is that the applicants' test scores had very little if any, influence on the referral decision.

As shown in Figure 13–5, the percentage of applicants considered to be good trainees by the instructors would have been much higher if available test norms had been used in referral. Figure 13–6 compares the percentages of good (68%) and poor (37%) trainees who qualified on the appropriate SATB. An additional analysis conducted as part of this study was a comparison of the 39 individuals who completed ⅓ or less of the training. While it was very difficult to determine the reason for trainee terminations, it was evident that one of the reasons for the vast majority was a lack of in-

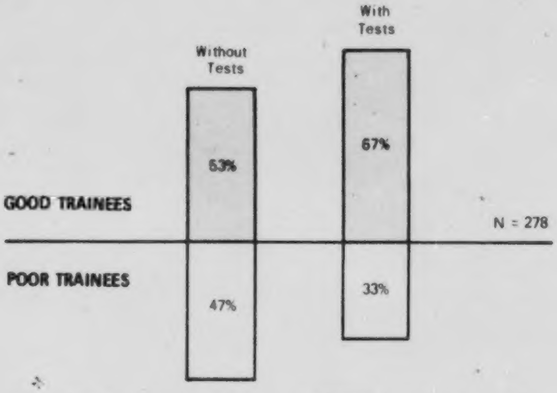

Fig. 13–5. Comparison of MDTA selective effectiveness with and without tests.

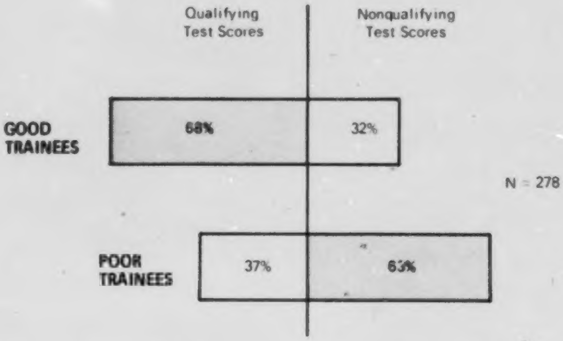

Fig. 13–6. Effectiveness of tests showing the pass/fail ratio of good and poor MDTA trainees.

terest and/or ability to perform. As shown in Figure 13–7 the SATB norms were quite effective in predicting early trainee terminations. Note that 68% of the trainees who dropped out after completing 15% or less of their training had non-qualifying aptitude scores. If the test norms had been strictly adhered to, two-thirds of the early terminations would have been avoided.

Sufficient data were available from this research to permit an inspection of the SATB effectiveness with two occupational samples (Combination Welder and General Office Clerk). The results obtained with these two specific occupational samples are quite similar to the results with the combined occupational sample. Figures comparable to Figure 13–5 are shown for Combination Welder (Figure 13–8) and General Office Clerk (Figure 13–9).

EFFECTIVENESS OF THE GATB IN COUNSELING

Studies have been conducted to determine

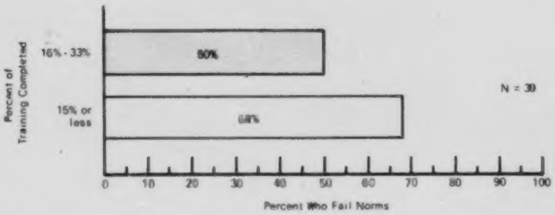

Fig. 13–7. Effectiveness of tests in predicting MDTA training terminations.

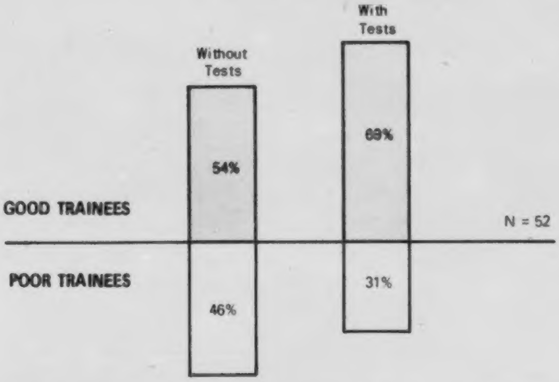

Fig. 13–8. Comparison of MDTA Combination Welder selective effectiveness with and without tests.

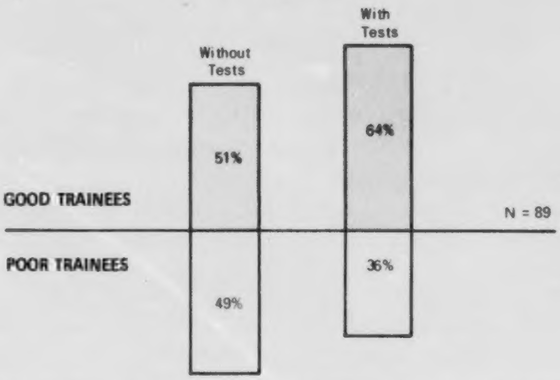

Fig. 13–9. Comparison of MDTA General Office Clerk selective effectiveness with and without tests.

the usefulness of the GATB in counseling when considered from the standpoint of both the individual and the employer. In a study conducted by Seitz (1949), the sample consisted of 353 high school seniors of both sexes who were tested with the GATB and counseled on the basis of their aptitude profiles during the school year 1947–48. Approximately one year after graduation, a tabulation was made of the number of graduates who followed the counselors' recommendations and were working in jobs which were regarded as suitable on the basis of their GATB results (classified as "followers") and of the number who were not working in such jobs (classified "non-followers"), and a study was made of the degree of occupational success and satisfaction for each group. Two criteria were used: the Hoppock Job Satisfaction Blank No. 5, which measures employee satisfaction, and a personnel evaluation scale developed specifically for this study to obtain employer ratings of job success. The results of the study indicated that:

1. There was a significant difference between the mean scores of the followers and the non-followers on the Hoppock Job Satisfaction Blank No. 5. The followers were more satisfied than the non-followers.
2. There was also a significant difference between the mean scores of the followers and non-followers as rated by employers on the personnel evaluation scale. The follower was rated higher by his employer than was the non-follower.

Another study, conducted by Malecki (1952), yielded similar results. The purpose of the study was to evaluate the General Aptitude Test Battery as a means of helping youth to make more adequate occupational choices. Various inventories were constructed for use in obtaining information from both employers and counselees in order to derive a vocational adjustment score for use as a criterion. Malecki found that:

"A statistically significant difference . . . existed between the mean vocational adjustment scores of those individuals who were tested with the GATB and had followed the recommendations for job placement suggested by their results on this battery and those persons who had taken this test but had not followed such recommendations. In view of the significant differences in the mean scores of the two groups of subjects who had taken the GATB, it may be concluded that it was of value in helping to bring about the satisfactory vocational adjustment of those persons who took the test and followed the recommendations made concerning their choice of occupation as suggested by the scores they obtained on this battery."

A study similar to those described above was initiated by the California State Employment Service in 1964. A sample of 269 individuals, ranging in age from 20 to 54, was tested with the GATB, given employment counseling and followed up. The plan was to contact as many as possible 2 years after the counseling to obtain ratings of job success by employers and scores on a job satisfaction scale. A analysis of the data showed that individuals employed in occupations for which they qualified on Occupational Aptitude Pattern (OAP) norms for the GATB were no more successful or better satisfied than those in occupations for which they did not meet the aptitude norms. There are indications that the negative results were at least partly a function of problems of sampling and deficiencies in the criteria.

In 1958, the Employment Service initiated the most extensive longitudinal validation study ever conducted on an aptitude test battery. This study on the GATB has several objectives, one of which is to evaluate the effectiveness of OAP norms in predicting occupational success. Of the 36,000 high school students originally tested with the GATB, many have been located 2 years after high school graduation. Ratings of job success have been obtained and analyses have been made to evaluate the effectiveness of the OAP's as predictors of occupational success (see Chapter 20 of this Section). These data, as well as data obtained 7 years after high school graduation, will be similarly analyzed using the 1970 edition of the OAP's.

In 1962, work was begun on a study to determine how effective USTES aptitude norms developed for printing occupations are when used in predicting vocational-technical school and job criteria of success in printing. About 200 students in two Indiana schools, a Connecticut school, and an Ohio school were tested. Ratings of performance were obtained from course instructors, and relationships between the appropriate GATB norms and this criterion of course success were determined. The results indicated that test norms established on employed samples are also predictive of course success in high school (Droege, 1965).

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14. Correlations With Other Tests

This chapter presents data on the correlations of GATB aptitude scores with scores on other widely used tests and interest measures. GATB aptitudes have substantial correlations with other aptitude and achievement tests which sample the same abilities. For example, the GATB Spatial Aptitude has high correlations with spatial components of the Differential Aptitude Tests. The GATB Verbal Aptitude correlates highly with such variables as the Airman Classification Battery Verbal Test and the Vocabulary subtest of the Cooperative English Test. Many of the correlations between tests designed to measure the same abilities exceed .70. Correlations are generally low in the studies in which GATB aptitudes are correlated with interest measures. Most of these correlations are near .00, and few are statistically significant.

Table 14–1 shows data on the samples involved in the studies. It is arranged in 12 columns. Sample code, GATB edition, year of GATB administration, State in which subjects were tested and type of sample appear in the first five columns. The last seven columns show other pertinent data on sample size, sex, age and education where available.

Table 14–2 shows the sample size and correlations of the individual tests, arranged in alphabetical sequence, with aptitudes of the GATB. Each test listing is preceded by the sample code in order to link the correlations in Table 14–2 with the sample for which information is presented in Table 14–1.

Table 14–1. Data on Samples Used in Studies on Correlations of GATB with other Tests

Sample Code	Edition	Year	State	Sample Type	Cases			Age (yrs)		Edu. (yrs)	
					Tot.	M	F	M	σ	M	σ
1	B-1001	1949	Mo.	College Freshmen Girls			1254	N.A.	N.A.	13.0	0.0
2	B-1001	1950	Mo.	College Freshmen Girls			1068	N.A.	N.A.	13.0	0.0
3	B-1001	1951	Mo.	College Freshmen Girls			1084	N.A.	N.A.	13.0	0.0
4	B-1002	1952	Mo.	College Freshmen Girls			1067	N.A.	N.A.	13.0	0.0
5	B-1002	1958	Texas	Basic Airmen		2649		N.A.	N.A.	N.A.	N.A.
6	B-1002	1952	Md.	High School Seniors	323			17.0	.60	12.0	0.0
6a	B-1002	1952	Md.	High School Seniors		150		17.1	.74	12.0	0.0
6b	B-1002	1952	Md.	High School Seniors			173	17.0	.44	12.0	0.0
7	B-1002	1962	Colo.	High School Sophomores	60	31	29	15.4	.3	10.0	0.0
8	B-1002	1955	Mass.	High School Seniors	187			N.A.	N.A.	12.0	0.0
9	B-1002	1959-1961	Mich.	High School Seniors	404			18.0	.49	12.0	0.0
9a	B-1002	1959-1961	Mich.	High School Seniors		194		18.1	.53	12.0	0.0
9b	B-1002	1959-1961	Mich.	High School Seniors			210	17.9	.42	12.0	0.0
10	B-1001	1962	Texas	High School Seniors	69[a]	44	25	18.3	.46	12.0	0.0
11	B-1002	1962-1964	Texas	High School Students	75	52	23	16.1	1.2	10.5	1.0

[a] N=68 for Age.

Table 14–1. Data on Samples Used in Studies on Correlations of GATB with other Tests —Continued.

Sample Code	Edition	Year	State	Sample Type	Cases			Age (yrs)		Edu. (yrs)	
					Tot.	M	F	M	σ	M	σ
11a	B-1002	1962-1964	Texas	High School Students	66	43	23	16.0	1.1	10.5	1.0
12	B-1002	1964	Calif.	High School Freshmen	216			N.A.	N.A.	9.0	0.0
12a	B-1002	1964	Calif.	High School Freshmen		98		N.A.	N.A.	9.0	0.0
12b	B-1002	1964	Calif.	High School Freshmen			118	N.A.	N.A.	9.0	0.0
13	B-1002	1958	Mich.	High School Freshmen	150			15.0	.5	9.0	0.0
13a	B-1002	1958	Mich.	High School Freshmen		74		15.2	.5	9.0	0.0
13b	B-1002	1958	Mich.	High School Freshmen			76	14.9	.4	9.0	0.0
14	B-1001	1948	Ohio	High School Seniors		78		N.A.	N.A.	12.0	0.0
15	B-1001	1948	Ohio	High School Seniors			90	N.A.	N.A.	12.0	0.0
16	B-1002	1964	Penna.	Local Office Applicants	464			25.1	6.4	11.4	1.1
17	B-1002	1959	Wisc.	High School Seniors	193	103	90	17.2	.4	12.0	0.0
18	B-1002	1960	Wisc.	High School Seniors	178	79	99	17.2	.4	12.0	0.0
19	B-1002	1963	Colo.	High School Seniors	59	29	30	17.4	.5	12.0	0.0
20	B-1002	1956	Nebr.	Local Office Applicants	266	162	103	23.4	7.3	12.0	1.4
21	B-1002	1955	Minn.	Local Office Applicants		92		23.8	5.9	11.5	1.6
22	B-1002	1957	Tenn.	High School Seniors		109		18.3	.6	12.0	0.0
23	B-1002	1957	Tenn.	High School Seniors			109	18.3	.6	12.0	0.0
24	B-1002	1955-1956	N. Y.	College Graduates (Interviewer Trainees)		50		29.8	8.4	16.4	1.0
25	B-1002	1955-1956	N. Y.	College Graduates (Interviewer Trainees)			46	29.0	8.3	16.3	.7
26	B-1002	1962-1963	Colo.	High School Juniors	64	21	43	17.0	.7	11.0	0.0
27	B-1002		Tenn.	Graduate Students	56			24.3	3.2	16.2	.5
28	B-1002	1962	Colo.	High School Juniors	50	23	27	16.9	.9	11.0	0.0
29	B-1002	1958	Mich.	High School Juniors	50	23	27	16.9	.3	11.0	0.0
30	B-1002	1958	Mich.	High School Sophomores	60	30	30	15.9	.4	10.0	0.0
31	B-1002	1958	Mich.	High School Freshmen	53	31	32	15.0	.4	9.0	0.0
32	B-1002	1964	Calif.	High School Freshmen	232			N.A.	N.A.	9.0	0.0
32a	B-1002	1964	Calif.	High School Freshmen		107		N.A.	N.A.	9.0	0.0
32b	B-1002	1964	Calif.	High School Freshmen			125	N.A.	N.A.	9.0	0.0
33	B-1001		Penna.	High School Seniors	150			N.A.	N.A.	12.0	0.0
34	B-1002	1964	Calif.	High School Freshmen	241			N.A.	N.A.	9.0	0.0
34a	B-1002	1964	Calif.	High School Freshmen		111		N.A.	N.A.	9.0	0.0
34b	B-1002	1964	Calif.	High School Freshmen			130	N.A.	N.A.	9.0	0.0
35	B-1002	1963	Colo.	High School Sophomores	109	55	54	15.7	.7	10.0	0.0
36	B-1002	1963-1964	Texas	College Freshmen	92	49	43	N.A.	N.A.	13.0	0.0

Table 14–1. Data on Samples Used in Studies on Correlations of GATB with other Tests.—Cont.

Sample Code	Edition	Year	State	Sample Type	Cases			Age (yrs)		Edu. (yrs)	
					Tot.	M	F	M	σ	M	σ
37	B-1002	1961–1964	Texas	High School Juniors	40	24	16	16.9	.9	11.3	.5
38	B-1002	1959	Wisc.	High School Seniors	191	103	88	17.2	.4	12.0	0.0
39	B-1002	1960	Wisc.	High School Seniors	172	75	97	17.2	.4	12.0	0.0
40	B-1002	1964	Calif.	High School Freshmen	196			N.A.	N.A.	9.0	0.0
40a	B-1002	1964	Calif.	High School Freshmen		91		N.A.	N.A.	9.0	0.0
40b	B-1002	1964	Calif.	High School Freshmen			105	N.A.	N.A.	9.0	0.0
41	B-1002	1952	Colo.	High School Freshmen	92	39	53	15.2	1.0	9.0	0.0
42	B-1002	1964–1965	Wisc.	High School Seniors	177	3	174	17.6	.5	12.0	0.0
43	B-1002	1958–1959	Wash.	Applicants	99[b]			21.8	3.1	11.8	1.0
43a	B-1002	1958–1959	Wash.	Applicants	97[c]			21.8	3.1	11.8	1.0
44	B-1002		Mich.	Vocational Counselees	69			23.0	8.0	N.A.	N.A.
45	B-1002	1964	Colo.	Disadvantaged Adults	[d]			N.A.	N.A.	N.A.	N.A.
46	B-1002	1963	Utah	Employed Workers			114	31.1	7.5	11.7	.9
47	B-1002	1963	Utah	Job Applicants			256	29.1	7.9	11.5	1.1
48	B-1002	N.A.	Wash.	Employed Workers	76	27	49	N.A.	N.A.	N.A.	N.A.
49	B-1002	1965	Mich.	Prison Inmates		50		34.6	7.4	9.7	1.7
50	B-1002	1965	Mich.	Prison Inmates		57		35.3	7.7	9.8	1.6
51	B-1002	1962–1963	Colo.	Psychiatric Technician Trainees	73			25.3	7.5	12.1	.7
52	B-1001 & B-1002		N. C.	School dropouts Age range 16-23	127			N.A.	N.A.	N.A.	N.A.
52a			N. C.			66		N.A.	N.A.	N.A.	N.A.
52b			N. C.				61	N.A.	N.A.	N.A.	N.A.
53	B-1002	1964	Colo.	High School Seniors	63	38	45	17.6	.5	12.0	0.0
54a	B-1002	1958	Mich.	High School Freshmen		67		N.A.	N.A.	9.0	0.0
54b	B-1002	1958	Mich.	High School Freshmen			80	N.A.	N.A.	9.0	0.0
55	B-1002	1961–1963	Colo.	Airplane Stewardess Trainee			76	20.6	1.3	12.9	1.0
56a	B-1002	1966	Wisc.	High School Seniors		47		N.A.	N.A.	12.0	0.0
56b	B-1002	1966	Wisc.	High School Seniors			65	N.A.	N.A.	12.0	0.0
57	B-1002	1961–1964	Colo.	High School Seniors	211	92	119	16.9	.72	12.0	0.0
58	B-1002	1962–1964	Colo.	High School Sophomores	73	41	32	15.8	.62	12.0	0.0
59	B-1002	1956–1962	Colo.	High School Sophomores	49	23	26	15.8	.44	10.0	0.0
60	B-1002 B-1001		N. C.	High School Dropouts	110	N.A.	N.A.	18.6	1.6	8.2	1.3

Table 14–1. Data on Samples Used in Studies on Correlations of GATB with other Tests.—Cont.

Sample Code	Edition	Year	State	Sample Type	Cases			Age (yrs)		Edu. (yrs)	
					Tot.	M	F	M	σ	M	σ
61	B–1001 B-1002		N. C.	High School Dropouts	179	N.A.	N.A.	18.5	1.5	8.7	1.9
62	B-1002	1968	Wisc.	High School Dropouts	40	23	17	N.A.	N.A.	N.A.	N.A.
63	B-1002	1967	Penna.	Potential High School Dropouts	130	77	53	17.7	N.A.	N.A.	N.A.
64	B-1002	1965–1966	Nev.	High School Dropouts	97	N.A.	N.A.	29.2	9.5	N.A.	N.A.

[b] N=95 for Education.

[c] N=95 for Education.

[d] N varies from 36 to 250 depending upon test.

Table 14–2. Correlations of GATB Aptitude Scores with other Tests.

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
1	ACE PSYCHOLOGICAL EXAMINATION	1254									
	Quantitative		.63	.40	.55						
	Linguistic		.64	.74	.40						
	Total		.72	.69	.52						
2	ACE PSYCHOLOGICAL EXAMINATION	1068									
	Quantitative		.67	.46	.46						
	Linguistic		.69	.81	.33						
	Total		.78	.75	.43						
3	ACE PSYCHOLOGICAL EXAMINATION	1084									
	Quantitative		.66	.47	.54						
	Linguistic		.72	.81	.42						
	Total		.78	.75	.53						
4	ACE PSYCHOLOGICAL EXAMINATION	1067									
	Quantitative		.71	.52	.57	.51	.40	.40	.09		
	Linguistic		.71	.80	.48	.36	.29	.37	.14		
	Total		.79	.76	.58	.47	.37	.42	.13		
53	ACT PROGRAM EXAMINATION	63									
	English		.56	.72	.40	.37	.40	.48	.12	−.10	.03
	Mathematics		.84	.58	.76	.55	.20	.19	−.05	.15	.17
	Social Studies		.61	.67	.34	.48	.11	.11	−.03	−.10	.02
	Natural Science		.73	.72	.54	.50	.32	.20	.03	.09	.16
	Composite		.81	.79	.60	.56	.29	.26	.02	.04	.12
5	AIRMAN CLASSIFICATION BATTERY	2649									
	Mechanical Aptitude Index		.27	.19	−.03	.49	.15	.01	−.05		
	Adm. Aptitude Index		.60	.62	.63	.13	.25	.41	.33		
	Radio Oper. Apt. Index		.58	.56	.50	.32	.33	.35	.35		
	General Aptitude Index		.78	.68	.64	.46	.29	.33	.22		
	Electronics Aptitude Index		.68	.55	.47	.58	.30	.26	.17		
	Mech. Biographical Inventory		−.12	−.18	−.21	.14	.01	−.11	−.12		
	Admin. Biographical Inventory		.12	.16	.22	.13	.03	.16	.16		
	Electron. Biographical Invt.		.31	.28	.25	.21	.16	.17	.12		
	Arithmetic Reasoning		.72	.54	.69	.35	.25	.32	.20		
	Verbal Test		.60	.74	.36	.28	.13	.23	.17		
	Mechanical Test		.40	.33	.13	.46	.13	.04	−.01		
	Tool Functions		.19	.07	−.01	.42	.14	.00	−.06		
	Figure Recognition		.44	.35	.26	.47	.30	.19	.14		
	Elemental Matching Speed		.38	.28	.42	.25	.47	.48	.36		

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
	Numerical Operations		.60	.40	.77	.20	.32	.41	.27		
	Technical Information		.56	.54	.30	.46	.19	.18	.10		
	Pattern Analysis		.52	.33	.32	.59	.31	.18	.13		
	Rhythm Test		.24	.27	.16	.16	.20	.17	.19		
	Army Radio Code Test		.42	.35	.38	.27	.30	.29	.33		
6	ARMY GENERAL CLASSIFICATION TEST	323	.70	.61	.60	.42	.28	.33	.14	.23	.16
6a	ARMY GENERAL CLASSIFICATION TEST	150	.61	.53	.58	.37	.32	.44	.23	.38	.21
6b	ARMY GENERAL CLASSIFICATION TEST	173	.78	.73	.67	.43	.35	.46	.21	.17	.16
7	CALIFORNIA ACHIEVEMENT TEST	60									
	Reading Vocabulary		.64	.74	.57	.18	.14	.37			
	Reading Comprehension		.71	.69	.62	.32	.07	.32			
	Arithmetic Reasoning		.74	.56	.68	.48	.16	.29			
	Arithmetic Fundamentals		.64	.52	.60	.38	.14	.30			
	Mechanics of English		.54	.61	.54	.12	.13	.42			
	Spelling		.54	.70	.50	.08	.05	.37			
57	CALIFORNIA SHORT FORM TEST OF MENTAL MATURITY	211									
	Mental Age		.75	.66	.55	.52	.30	.29	.07	.01	.06
8	CALIFORNIA TEST OF MENTAL MATURITY	187									
	Language		.76	.77	.52	.09	.12	.32	−.01		
	Non-Language		.62	.49	.51	.30	.17	.19	−.04		
	Total Mental Maturity		.81	.69	.70	.22	.25	.25	−.02		
9	CALIFORNIA TEST OF MENTAL MATURITY	404									
	Total Mental (Total)		.78	.74	.56	.44	.35	.36	.14	.16	.11
9a	CALIFORNIA TEST OF MENTAL MATURITY	194									
	Total Mental (Boys)		.81	.78	.58	.46	.28	.45	.15	.20	.02
9b	CALIFORNIA TEST OF MENTAL MATURITY	210									
	Total Mental (Girls)		.75	.72	.54	.46	.47	.42	.16	.16	.21
10	COLLEGE ENTRANCE EXAMINATION BOARD SCHOLASTIC APTITUDE TEST	69									
	Verbal		.73	.78	.51	.35	−.01	.33	.19	.09	−.02
	Mathematical		.72	.52	.60	.48	.21	.16	.11	.14	.05

Table 14–2. Correlations of GATB Aptitude Scores with other Tests—Continued.

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
45	COLOURED PROGRESSIVE MATRICES	[a]									
	Total		.52	.39	.48	.53	.55	.45	.28	.28	.27
4	COOPERATIVE ENGLISH TEST	1067									
	Vocabulary		.56	.72	.32	.22	.10	.20	.03		
	Speed of Comprehension		.56	.62	.38	.27	.20	.29	.05		
	Level of Comprehension		.49	.54	.32	.24	.17	.24	.03		
	Total		.58	.67	.37	.26	.16	.24	.03		
11a	DIAGNOSTIC READING TEST	66									
	Rate of Reading		.29	.43	.13	.10	.06	.26	.15	−.02	−.08
	Vocabulary		.63	.70	.24	.36	.18	.27	.15	.16	.05
	Comprehension		.47	.47	.18	.21	−.07	.03	−.12	.08	−.04
12	DIFFERENTIAL APTITUDE TESTS	216									
	Abstract Reasoning		.57	.49	.51	.40	.32	.33	.04	.05	.12
	Space Relations		.60	.44	.44	.62	.36	.27	.08	.16	.16
	Mechanical Reasoning		.46	.35	.27	.49	.12	.16	−.01	.03	.05
	Clerical Speed and Accuracy		.43	.29	.52	.30	.59	.58	.25	.34	.35
12a	DIFFERENTIAL APTITUDE TESTS	98									
	Abstract Reasoning		.59	.54	.53	.27	.31	.30	−.02	.04	.08
	Space Relations		.62	.47	.48	.58	.36	.28	.18	.13	.16
	Mechanical Reasoning		.52	.39	.36	.50	.24	.28	.02	.06	.04
	Clerical Speed and Accuracy		.50	.34	.53	.36	.51	.47	.20	.26	.34
12b	DIFFERENTIAL APTITUDE TESTS	118									
	Abstract Reasoning		.57	.47	.52	.50	.40	.41	.11	.10	.16
	Space Relations		.59	.43	.43	.66	.41	.32	.05	.21	.18
	Mechanical Reasoning		.49	.42	.32	.44	.25	.31	.12	.11	.13
	Clerical Speed and Accuracy		.40	.24	.49	.34	.58	.58	.20	.35	.33
11	DIFFERENTIAL APTITUDE TESTS	75[b]									
	Space Relations		.53	.24	.19	.66	.28	.04	.04	.03	−.07
	Mechanical Reasoning		.52	.26	.18	.64	.27	.11	.21	.20	.27
	Clerical Speed		.31	.35	.36	.18	.50	.67	.54	.48	.37
	Language Usage										
	Spelling		.46	.44	.41	.11	.00	.30	−.09	−.07	−.21
	Sentences		.48	.58	.29	.10	−.09	.21	−.11	−.14	−.31
13	DIFFERENTIAL APTITUDE TESTS	150[c]									
	Verbal Reasoning		.75	.77	.49	.42	.16	.21	−.20	.24	.02
	Numerical Ability		.71	.56	.60	.39	.17	.16	−.26	.24	.08

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
	Abstract Reasoning		.60	.48	.38	.50	.08	.12	−.14	.23	.09
	Space Relations		.67	.48	.44	.66	.36	.26	−.19	.24	.08
	Mechanical Reasoning		.64	.56	.32	.60	.20	.08	−.14	.25	.16
	Clerical Speed		.40	.32	.55	.21	.44	.54	.21	.32	.21
	Language Usage										
	Spelling		.52	.63	.42	.12	.09	.26	.01	.15	−.04
	Sentences		.66	.66	.48	.38	.17	.20	.06	.26	.17
13a	DIFFERENTIAL APTITUDE TESTS	74[d]									
	Verbal Reasoning		.72	.76	.53	.36	.05	.20	−.41	.04	−.22
	Numerical Ability		.68	.61	.66	.21	.03	.24	−.35	.10	−.17
	Abstract Reasoning		.60	.54	.43	.46	.01	.12	−.21	.10	−.09
	Space Relations		.68	.61	.46	.56	.27	.24	−.20	.18	−.06
	Mechanical Reasoning		.66	.64	.39	.53	.08	−.01	−.24	.11	−.08
	Clerical Speed		.44	.34	.57	.16	.45	.66	.18	.26	.08
	Language Usage										
	Spelling		.56	.68	.42	.16	.10	.30	−.19	.08	−.28
	Sentences		.62	.67	.48	.29	.09	.29	.00	.15	.03
13b	DIFFERENTIAL APTITUDE TESTS	76[e]									
	Verbal Reasoning		.78	.79	.46	.47	.25	.25	−.02	.41	.23
	Numerical Ability		.74	.52	.58	.55	.33	.15	−.15	.40	.34
	Abstract Reading		.60	.43	.35	.56	.16	.16	−.08	.36	.25
	Space Relations		.66	.38	.44	.76	.45	.30	−.19	.30	.22
	Mechanical Reasoning		.62	.51	.28	.68	.36	.22	−.02	.38	.39
	Clerical Speed		.35	.30	.55	.26	.48	.53	.28	.39	.35
	Language Usage										
	Spelling		.50	.59	.44	.10	.09	.24	.22	.23	.23
	Sentences		.71	.70	.54	.43	.35	.25	.21	.39	.32
14	DIFFERENTIAL APTITUDE TESTS	78									
	Verbal Reasoning		.78	.72	.54	.54	.21	.41	.29	.20	−.03
	Numerical Ability		.66	.52	.62	.32	.01	.22	.27	.13	.05
	Abstract Reading		.68	.48	.45	.56	.14	.26	.21	.17	.00
	Space Relations		.59	.49	.24	.72	.21	.22	.19	.35	.11
	Mechanical Reasoning		.62	.56	.25	.68	.13	.09	.24	.39	.08
	Clerical Speed		.25	.18	.33	.07	.46	.53	.61	.27	.46
	Spelling		.66	.66	.57	.21	.03	.51	.32	.08	.10
	Sentences		.74	.75	.56	.36	.05	.33	.33	.17	.12
15	DIFFERENTIAL APTITUDE TESTS	90									
	Verbal Reasoning		.72	.68	.49	.47	.21	.24	.08	.17	−.04
	Numerical Ability		.53	.33	.51	.28	.03	.22	−.04	.25	.20

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	G	V	N	S	P	Q	K	F	M
			Aptitudes of the GATB								
	Abstract Reasoning		.57	.30	.38	.52	.25	.18	−.03	.18	.05
	Space Relations		.52	.29	.26	.66	.44	.20	.15	.30	.18
	Mechanical Reasoning		.43	.25	.26	.41	.16	.04	.01	.16	.23
	Clerical Speed		.15	.05	.34	.06	.43	.59	.38	.27	.29
	Spelling		.59	.59	.59	.21	.12	.52	.18	.18	.16
	Sentences		.62	.68	.43	.26	.10	.28	.16	.11	.03
16	DIFFERENTIAL APTITUDE TESTS	464									
	Verbal Reasoning		.58	.66	.37	.21	.20	.27	.15	.07	.04
	Numerical Ability		.62	.39	.69	.24	.35	.42	.18	.14	.11
	Space Relations		.46	.13	.22	.60	.41	.18	.01	.27	.12
	Mechanical Reasoning		.37	.24	.08	.44	.20	.05	−.08	.20	.09
45	DIFFERENTIAL APTITUDE TESTS	[f]									
	Verbal Reasoning		.61	.70	.48	.40	.34	.50	.33	.08	.05
	Numerical Ability		.60	.53	.57	.41	.38	.47	.41	.17	.16
	Abstract Reasoning		.65	.53	.56	.56	.57	.57	.41	.31	.25
	Space Relations		.60	.40	.42	.70	.52	.47	.30	.26	.17
	Mechanical Reasoning		.51	.42	.42	.48	.47	.39	.30	.20	.12
	Clerical Speed		.52	.42	.57	.42	.64	.65	.52	.31	.22
	Spelling		.52	.66	.46	.29	.36	.52	.42	.15	.11
	Sentences		.55	.66	.39	.31	.31	.38	.34	.14	.33
45	GEIST PICTURE INTEREST INVENTORY	[g]									
	Persuasive		−.11	−.19	−.03	−.14	−.08	−.02	−.11	−.16	−.12
	Clerical		−.03	−.05	.06	−.09	.09	.11	.04	−.04	.03
	Mechanical		−.08	−.11	−.03	−.05	.01	−.09	−.04	−.11	−.02
	Musical		.00	.00	.01	.01	.10	.08	.06	−.01	.05
	Scientific		.17	.06	.15	.17	.24	.20	.17	.05	.11
	Outdoor		−.05	−.07	−.02	−.02	.04	−.04	−.01	−.13	−.01
	Literary		.07	.02	.12	.02	.16	.16	.09	−.03	.06
	Computational		.23	.13	.26	.21	.24	.27	.19	.03	.09
	Artistic		.02	−.02	.04	.05	.16	.13	.14	−.01	.11
	Social Service		−.03	−.07	.02	−.01	.09	.07	.01	−.07	−.02
	Dramatic		−.12	−.11	−.11	−.11	−.02	−.02	.00	−.08	.07
63	HACKMAN-GAITHER VOCATIONAL INTEREST INVENTORY	130									
	Business Contact		.06	.03	−.03	−.02	−.03	.11	−.05	.00	−.06
	Science-Technical		−.12	−.06	−.14	.20	−.04	−.17	.13	.10	.13
	Artistic		−.12	−.12	.00	−.01	.21	.02	−.02	.04	−.02
	Health and Welfare		.10	.13	−.01	−.13	.01	−.08	−.01	.05	−.00

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
	Business Clerical		.05	.17	.22	−.21	−.18	.18	−.08	−.08	−.09
	Mechanical		.10	−.07	−.12	.05	−.02	−.04	.07	−.02	.10
	Service		−.10	−.07	.05	.03	.11	−.19	.06	.08	−.01
	Outdoor		.01	−.01	.02	.11	−.04	.13	−.10	−.13	.00
17	HENMON-NELSON TEST OF MENTAL MATURITY	193[h]	.84	.80	.72	.50	.41	.46	.12	−.08	−.20
18	HENMON-NELSON TEST OF MENTAL MATURITY	178	.82	.74	.66	.42	.31	.39	.20	.20	.00
58	HENMON-NELSON TEST OF MENTAL ABILITY	73	.82	.82	.71	.47	.51	.45			
19	IOWA TEST OF EDUCATIONAL DEVELOPMENT	59									
	Background Soc. Stds.		.65	.74	.50	.48	.15	.07			
	Natural Sciences		.70	.71	.58	.55	.07	.11			
	Correctness in Expression		.57	.68	.43	.39	.38	.34			
	Quantitative Thinking		.79	.66	.72	.60	.22	.08			
	Reading-Soc. Stds.		.68	.79	.52	.49	.17	.17			
	Reading-Nat. Scn.		.70	.72	.61	.51	.20	.08			
	Reading-Literature		.67	.81	.49	.39	.21	.27			
	General Vocabulary		.72	.85	.56	.45	.23	.23			
	Composite		.78	.84	.63	.55	.22	.18			
	Use of Sources		.68	.75	.58	.52	.27	.32			
45	IPAT CULTURE FAIR INTELLIGENCE TEST	[i]									
	Test 1		.69	.58	.64	.64	.71	.66	.53	.38	.29
	Test 2		.56	.43	.52	.53	.55	.48	.42	.28	.23
	Test 3		.63	.50	.59	.59	.61	.54	.47	.39	.29
	Test 4		.42	.29	.46	.43	.47	.35	.30	.21	.22
	Total		.73	.56	.70	.69	.74	.65	.55	.40	.32
55	KUDER PREFERENCE RECORD-PERSONAL	76									
	Group Activity		.09	−.10	.08	.12	.28	.15	.08	.05	−.01
	Stable Situations		−.11	−.16	−.11	.02	−.18	−.18	−.22	−.03	−.03
	Working With Ideas		.11	.00	.17	.01	.06	.06	.10	.19	.11
	Avoiding Conflict		−.15	−.19	−.08	−.17	−.21	−.40	−.17	−.20	−.09
	Directing Others		.32	.10	.27	.35	.35	.27	.28	.09	.09
20	KUDER PREFERENCE RECORD-VOCATIONAL	266									
	Outdoor		.13	−.07	.03	.24	.01	−.33	−.33	−.12	−.09
	Mechanical		.10	−.09	.00	.26	.00	−.26	−.16	.06	.09
	Occupational		.08	.14	.43	.16	.18	.14	.11	.03	.18
	Scientific		.17	.08	.09	.18	−.01	.13	.00	.05	.10

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
	Persuasive		.02	.08	.00	-.10	-.43	.02	.04	-.11	.02
	Artistic		.05	.08	-.09	.21	.12	.05	.05	.10	.07
	Literary		.02	.18	.05	-.12	.02	.07	.02	-.14	.10
	Musical		-.07	.06	-.13	-.11	-.08	.04	.08	-.04	-.15
	Social Service		.18	-.10	-.08	-.20	-.01	.12	.07	.08	-.08
	Clerical		.39	.42	.53	.25	.48	.63	.51	.39	.41
21	KUDER PREFERENCE RECORD-VOCATIONAL	92									
	Outdoor		-.07	-.07	-.10	-.05	-.08	-.25	-.20	-.14	-.19
	Mechanical		.06	.03	.04	.09	-.13	-.11	-.19	.09	.03
	Computational		.32	.14	.54	.10	.11	.32	.15	.06	.16
	Scientific		.14	.11	.19	-.02	.13	.01	.07	.14	-.01
	Persuasive		-.11	-.09	-.10	-.08	.08	.08	.16	.07	.19
	Artistic		-.09	-.07	-.27	.22	-.03	-.11	-.02	-.02	-.12
	Literary		.19	.42	.02	.03	.03	.17	.20	.00	-.01
	Musical		.02	.06	-.11	.10	-.09	-.09	.15	-.03	-.16
	Social Service		-.03	-.08	.03	-.03	.16	.02	-.02	-.12	-.01
	Clerical		-.16	-.17	.10	-.21	-.06	.09	.02	-.03	.04
22	KUDER PREFERENCE RECORD—VOCATIONAL	109									
	Outdoor		-.08	-.11	-.17	.09	-.14	-.14	-.18	.05	.00
	Mechanical		-.13	-.23	-.26	.07	-.18	-.29	-.11	.21	.18
	Computational		.20	-.01	.34	.13	.18	.17	.03	.01	.06
	Scientific		.23	.18	.22	.27	.08	.16	-.06	.18	.12
	Persuasive		-.13	-.08	-.12	-.22	-.03	-.12	.10	-.10	.02
	Artistic		.08	.06	-.11	.26	.02	-.01	-.09	.13	.08
	Literary		.31	.41	.20	.11	.07	.16	.08	-.19	-.15
	Musical		.03	.09	.06	-.10	.20	.04	.16	.02	-.07
	Social Service		-.18	-.21	-.02	-.21	-.22	-.04	-.01	-.27	-.14
	Clerical		-.12	-.15	.05	-.22	.08	.07	-.01	.00	-.05
23	KUDER PREFERENCE RECORD—VOCATIONAL	109									
	Outdoor		.10	.02	.04	.13	.18	-.06	.12	.07	.10
	Mechanical		-.09	-.20	-.09	.12	-.03	-.14	-.08	-.02	-.04
	Computational		-.10	-.08	-.01	-.05	-.02	-.03	-.03	.03	.07
	Scientific		-.07	-.12	-.13	.04	.03	-.10	-.08	-.19	-.03
	Persuasive		.06	.13	.02	-.03	-.15	.06	-.09	-.05	-.03
	Artistic		.12	-.02	.04	.25	.23	.02	.03	.14	.01
	Literary		.20	.28	.11	-.06	-.12	.04	.07	.00	.00
	Musical		.08	.10	.10	.05	-.02	.05	.06	.13	.00
	Social Service		.18	.19	.11	.13	.07	.14	.05	.03	.09
	Clerical		-.24	-.12	-.12	-.24	-.17	-.02	-.06	-.06	-.10

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
24	KUDER PREFERENCE RECORD—VOCATIONAL	50									
	Mechanical		.09	−.01	−.25	.40	.14	−.05	.01		
	Computational		.28	.14	.07	.28	.08	.16	.22		
	Scientific		.29	.16	−.02	.33	.05	−.05	.02		
	Persuasive		−.15	−.06	.14	−.26	−.14	.06	−.20		
	Artistic		.18	.10	−.06	.32	.02	−.07	.18		
	Literary		−.01	.01	.03	−.03	−.13	−.08	−.34		
	Musical		−.16	−.10	−.04	−.21	.04	.04	.06		
	Social Service		−.19	−.10	.04	−.37	.06	.07	−.10		
	Clerical		.01	.03	−.02	−.02	.02	.15	.24		
25	KUDER PREFERENCE RECORD—VOCATIONAL	46									
	Mechanical		.22	−.03	.05	.32	.13	.09	−.11		
	Computational		−.01	−.32	.16	−.04	−.08	−.08	−.18		
	Scientific		−.02	−.07	.00	.05	−.04	−.09	−.07		
	Persuasive		−.22	−.10	.07	−.31	−.08	.18	.20		
	Artistic		.37	.20	−.20	.49	.34	−.18	.25		
	Literary		.09	.36	−.05	.09	.06	−.04	−.08		
	Musical		−.22	−.08	−.33	.01	−.17	.08	.01		
	Social Service		−.20	.04	.09	−.39	.42	−.09	−.01		
	Clerical		−.23	−.35	.06	−.16	−.10	.01	−.15		
54a	KUDER PREFERENCE RECORD—VOCATIONAL	67									
	Outdoor		−.10	−.16	−.14	−.12	−.20	−.18	−.12	−.01	−.02
	Mechanical		−.07	−.20	−.13	.08	−.02	−.19	−.07	.14	.10
	Computational		.00	−.18	.19	−.04	−.06	−.05	−.06	.01	.02
	Scientific		.14	.28	−.08	.06	.06	−.12	−.15	.17	.08
	Persuasive		.19	.30	.20	.02	.05	.18	.10	.05	−.19
	Artistic		−.05	.03	.03	.04	.22	.27	.20	−.01	.22
	Literary		.01	.00	−.04	.14	.18	.08	.06	−.18	−.13
	Musical		−.01	.04	−.02	−.06	−.13	−.06	−.06	−.13	.01
	Social Service		.23	.29	.20	−.02	−.03	.13	.05	.11	.00
	Clerical		−.24	−.34	−.11	−.14	−.11	−.06	−.11	−.10	−.05
54b	KUDER PREFERENCE RECORD—VOCATIONAL	80									
	Outdoor		−.14	−.14	−.18	−.06	−.08	−.22	−.09	−.10	−.09
	Mechanical		−.30	.36	−.24	−.10	−.36	−.35	−.14	.08	.04
	Computational		.52	.48	.55	.20	.44	.46	.02	.09	−.09
	Scientific		.41	.57	.25	.17	.26	.26	−.04	.08	−.08
	Persuasive		−.23	−.10	−.17	−.20	−.10	−.05	−.09	−.02	−.08
	Artistic		−.14	−.11	.02	−.08	−.08	−.05	−.05	.04	.01
	Literary		−.20	−.20	−.27	.01	−.07	−.12	.08	−.04	.02

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
	Musical		.31	.24	.17	.33	.12	.18	.23	.28	.10
	Social Service		.08	.03	.08	−.02	.17	.11	.17	−.15	.02
	Clerical		.08	.00	.18	.08	.02	.08	−.04	−.02	−.04
55	KUDER PREFERENCE RECORD—VOCATIONAL	76									
	Outdoor		.06	.21	−.16	−.05	−.08	−.17	−.15	−.06	−.06
	Mechanical		.04	−.04	−.22	.32	.03	.03	−.19	.03	.06
	Computational		−.10	−.24	.15	.07	−.01	−.07	.04	.16	.00
	Scientific		−.15	−.10	−.10	−.04	.04	.06	−.04	.10	.20
	Persuasive		.02	−.05	.03	−.02	−.03	.03	.09	−.07	−.09
	Artistic		.16	.19	−.11	−.18	.23	−.07	−.02	.05	.04
	Literary		.30	.45	.32	.04	.08	.09	.13	.10	.08
	Musical		−.03	−.04	.09	−.16	−.10	.04	.05	−.20	.21
	Social Service		−.30	−.28	−.09	−.27	−.04	.19	−.08	.02	−.03
	Clerical		−.11	−.27	.11	.04	−.14	.01	.06	−.05	.03
56a	KUDER PREFERENCE RECORD—VOCATIONAL	47									
	Outdoor		−.26	−.20	−.09	−.22	.02	.12	.20	.09	.23
	Mechanical		−.02	−.12	.11	.09	−.03	.22	−.13	.14	−.06
	Computational		.45	.30	.60	.12	.08	.14	−.21	.19	.12
	Scientific		.59	.52	.53	.40	.16	.10	.12	.22	.12
	Persuasive		−.36	−.26	−.36	−.27	−.45	−.42	−.12	−.13	−.24
	Artistic		−.22	−.22	−.33	.02	.18	.02	.05	.16	.24
	Literary		.16	.32	.07	−.16	.10	.28	.05	−.27	−.10
	Musical		−.42	−.27	−.66	−.18	−.21	−.40	−.06	−.42	−.23
	Social Service		−.04	−.12	−.05	.25	.15	.12	−.06	−.01	−.18
	Clerical		.20	.20	.23	.10	.06	.26	.05	−.05	.10
56b	KUDER PREFERENCE RECORD—VOCATIONAL	65									
	Outdoor		−.01	.03	−.08	.01	−.09	.01	−.25	−.11	−.11
	Mechanical		−.05	−.09	−.15	.04	−.03	−.21	−.27	−.29	−.14
	Computational		.11	.01	.24	.02	.03	.08	−.09	.07	−.15
	Scientific		.14	.11	.15	.06	.01	.09	−.11	−.01	−.06
	Persuasive		−.28	−.06	.17	−.24	−.09	.13	.26	.04	−.03
	Artistic		.02	−.06	−.10	.18	.13	−.01	−.06	−.26	−.07
	Literary		.36	.38	.30	.23	.20	.12	−.03	.23	.10
	Musical		−.16	−.29	−.17	.00	−.08	−.18	.10	−.04	.15
	Social Service		−.12	−.15	−.03	−.26	−.16	−.06	.03	.00	.00
	Clerical		−.07	−.07	−.02	−.05	−.03	−.02	.08	.16	−.05

Table 14–2. Correlations of GATB Aptitude Scores with other Tests—Continued.

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
26	LORGE-THORNDIKE INTELLIGENCE TEST	64									
	Level 5, Form A										
	Verbal		.73	.78	.63	.48	.34	.37	.06	.21	.16
	Nonverbal		.66	.50	.55	.68	.48	.51	.12	.26	.22
	Total		.78	.71	.66	.60	.47	.50	.10	.26	.21
45	MECHANICAL COMPREHENSION TEST	36	.46	.27	.46	.58	.45	.27	.28	.02	.11
45	METROPOLITAN ACHIEVEMENT TESTS (ELEMENTARY BATTERY)										
	Word Knowledge	250	.58	.66	.53	.35	.38	.53	.32	.13	.03
	Word Discrimination	250	.51	.57	.49	.30	.36	.48	.30	.14	.06
	Reading	250	.69	.07	.64	.47	.52	.63	.44	.25	.17
	Spelling	251	.47	.57	.44	.26	.29	.46	.28	.05	.04
	Language: Usage	250	.62	.67	.53	.43	.43	.57	.38	.24	.18
	Language: Punctuation	250	.64	.61	.65	.48	.55	.60	.48	.26	.21
	Language: Total	235	.69	.68	.66	.50	.55	.64	.47	.26	.20
	Arithmetic Computation	227	.63	.54	.72	.43	.42	.51	.38	.22	.14
	Arithmetic Problem Solving and Concepts	227	.65	.54	.72	.43	.46	.52	.33	.25	.19
27	MILLER ANALOGIES TEST	56[k]	.53	.64	.28	.23	.04	.30	.07	.22	−.03
21	MINNESOTA VOCATIONAL INTEREST INVENTORY	92									
	Bakers		−.28	−.29	−.23	−.18	−.01	−.12	.09	−.08	−.09
	Carpenters		−.01	.00	−.15	.12	−.10	−.05	−.21	.02	−.05
	Electricians		.25	.10	.28	.04	.04	.01	−.04	.18	.11
	IBM Operators		.02	.01	.18	−.08	.20	.22	.24	−.04	.12
28	NATIONAL MERIT SCHOLARSHIP QUALIFYING TEST	50									
	English Usage		.66	.72	.49	.18	.23	.43			
	Math Usage		.45	.27	.43	.25	.30	.38			
	Social Studies Reading		.67	.67	.46	.29	.16	.26			
	Natural Science Reading		.62	.63	.40	.32	.26	.29			
	Word Usage		.71	.78	.47	.24	.21	.44			
	Composition		.76	.75	.54	.31	.28	.44			
29	NATIONAL MERIT SCHOLARSHIP QUALIFYING TEST	50									
	Total		.75	.71	.57	.47	.33	.35	.19	.18	−.12

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
30	NATIONAL MERIT SCHOLARSHIP QUALIFYING TEST	60									
	Total		.79	.72	.55	.38	.36	.35	.19	.34	.09
31	NATIONAL MERIT SCHOLARSHIP QUALIFYING TEST	53									
	Total		.69	.69	.30	.53	−.02	.10	.07	−.02	.16
32	OCCUPATIONAL INTEREST INVENTORY (LEE-THORPE)	232									
	Personal-Social		−.07	.06	.02	−.18	.12	.17	.07	.02	−.07
	Natural		−.16	−.18	−.19	.03	−.11	−.19	−.10	.10	.03
	Mechanical		.01	−.08	−.06	.16	−.13	−.21	−.21	−.11	−.07
	Business		.10	.14	.16	−.04	.17	.22	.10	.06	.03
	The Arts		−.24	−.17	.22	−.18	−.02	−.10	.12	.06	.02
	The Sciences		.07	.05	.02	.06	−.02	.00	.02	.01	.07
	Verbal		−.04	.03	.04	−.17	.16	.19	.16	.02	−.04
	Manipulative		−.06	−.01	−.03	−.13	.11	.12	.15	.10	.04
	Computational		.04	.05	.09	−.05	.17	.23	.16	.11	.11
	Level of Interests		−.10	−.08	−.14	−.05	−.12	−.14	−.14	−.16	−.17
32a	OCCUPATIONAL INTEREST INVENTORY (LEE-THORPE)	107									
	Personal-Social		−.10	.00	−.01	−.19	−.02	.06	−.03	−.30	−.29
	Natural		−.16	−.17	−.16	−.01	−.05	−.09	−.01	.24	.18
	Mechanical		.09	.03	.10	.10	.10	.09	−.16	.00	.07
	Business		.04	.09	.10	−.10	.06	.04	−.14	−.22	−.14
	The Arts		−.21	−.21	−.25	−.06	−.12	−.30	.08	.07	.04
	The Sciences		.13	.07	.12	.07	.07	.06	.18	.10	.27
	Verbal		−.06	−.01	−.02	−.12	.00	−.05	−.06	−.26	−.26
	Manipulative		−.03	−.09	−.03	−.06	−.09	−.12	.09	.02	−.06
	Computational		.03	−.04	.08	.09	.07	−.04	.02	−.09	.05
	Level of Interests		−.06	−.03	−.05	−.02	−.07	−.16	−.23	−.17	−.16
32b	OCCUPATIONAL INTEREST INVENTORY (LEE-THORPE)	125									
	Personal-Social		−.08	.05	−.04	−.09	.03	.05	−.04	.16	−.02
	Natural		−.15	−.16	−.18	−.01	−.03	−.14	−.04	.08	−.02
	Mechanical		.02	−.07	−.02	.11	.07	−.06	.05	.03	−.01
	Business		.14	.13	.15	.06	.05	.14	.08	.18	.05
	The Arts		−.34	−.25	−.34	−.23	−.17	−.23	−.03	−.08	−.10
	The Sciences		.03	.05	−.02	.03	−.02	.01	−.04	−.02	−.03
	Verbal		−.12	−.06	−.08	−.11	−.05	.03	.04	−.01	−.01
	Manipulative		−.17	−.10	−.20	−.06	−.08	−.05	−.08	−.02	−.04

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
	Computational		.03	.02	.00	−.01	.01	.14	.00	.09	.04
	Level of Interests		−.14	−.12	−.19	−.08	−.16	−.13	−.09	−.16	−.18
45	OTIS GROUP INTELLIGENCE SCALE ADVANCED	[l]	.78	.80	.72	.47	.52	.61	.42	.28	.14
33	OTIS SELF-ADMINISTERING TEST OF MENTAL ABILITY	150	.76	.70							
51	OTIS SELF-ADMINISTERING TEST OF MENTAL ABILITY	73	.73								
59	OTIS SELF-ADMINISTERING TEST OF MENTAL ABILITY	49	.68	.63	.56	.32	.25	.44			
43a	PURDUE PEGBOARD	97									
	Right Hand		.08	.15	.07	.09	.19	.12	.33	.33	.37
	Left Hand		.12	.03	.09	.19	.10	.02	.32	.36	.46
	Both Hands		.12	.12	.12	.15	.19	.11	.33	.37	.36
	Right, Left & Both Hands		.12	.07	.14	.19	.21	.10	.37	.38	.50
45	QUICK TEST	[m]	.47	.64	.35	.27	.26	.31	.36	.21	.27
50	REVISED BETA EXAMINATION	57									
	Mazes		.43	.33	.36	.51	.32	.23	.19	.43	.36
	Symbol Digit Substitution		.45	.37	.45	.36	.42	.40	.44	.34	.32
	Picture Reasoning		.49	.44	.32	.54	.55	.36	.23	.28	.33
	Spatial Relations		.62	.46	.51	.79	.54	.43	.21	.35	.42
	Pictorial Completion		.27	.10	.28	.44	.40	.37	.23	.19	.36
	Similarities		.46	.42	.46	.46	.61	.60	.42	.42	.34
	Total Score		.63	.50	.55	.72	.65	.54	.38	.46	.49
	IQ Score		.64	.54	.54	.65	.56	.55	.34	.36	.39
45	REVISED BETA EXAMINATION	219									
	Total Score		.70	.53	.66	.71	.76	.71	.59	.47	.40
34	SCHOOL AND COLLEGE ABILITY TEST	241									
	Verbal		.31	.32	.26	.12	.05	.15	.20	.05	.00
	Quantitative		.74	.65	.73	.45	.41	.50	.18	.11	.17
	Total		.77	.79	.68	.42	.36	.43	.12	.08	.15
34a	SCHOOL AND COLLEGE ABILITY TEST	111									
	Verbal		.22	.22	.22	.01	−.01	.14	.33	.03	−.04
	Quantitative		.73	.68	.76	.34	.40	.42	.26	−.03	.09
	Total		.78	.82	.72	.33	.37	.40	.14	−.04	.11

Table 14–2. Correlations of GATB Aptitude Scores with other Tests—Continued.

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
34b	SCHOOL AND COLLEGE ABILITY TEST	130									
	Verbal		.67	.73	.51	.45	.24	.33	.06	.14	.10
	Quantitative		.75	.62	.72	.56	.44	.59	.13	.24	.24
	Total		.77	.76	.65	.53	.36	.47	.10	.20	.17
35	SCHOOL AND COLLEGE ABILITY TEST	109									
	Verbal		.60	.76	.48	.29	.19	.28			
	Quantitative		.75	.59	.76	.43	.36	.35			
	Total		.75	.72	.70	.40	.41	.35			
36	SCHOOL AND COLLEGE ABILITY TEST	92									
	Verbal		.64	.72	.54	.13	.06	.16			
	Quantitative		.75	.48	.76	.36	.33	.26			
	Total		.78	.68	.73	.28	.22	.23			
37	SCHOOL AND COLLEGE ABILITY TEST	40									
	Verbal		.52	.79	.25	.09	.06	.12	.06	.23	.13
	Quantitative		.58	.35	.56	.32	.12	.09	−.16	−.01	−.14
	Total		.67	.70	.46	.26	.13	.13	−.04	.17	.02
38	SCHOOL AND COLLEGE ABILITY TEST	191									
	Verbal		.75	.83	.56	.43	.31	.40	.10	.11	.06
	Quantitative		.84	.67	.80	.54	.34	.36	.12	.11	.08
	Total		.85	.81	.72	.52	.34	.41	.11	.12	.07
39	SCHOOL AND COLLEGE ABILITY TEST	172									
	Verbal		.77	.81	.54	.32	.26	.37	.24	.24	.00
	Quantitative		.82	.66	.78	.37	.20	.33	.12	.19	.07
	Total		.87	.81	.71	.38	.26	.40	.21	.24	.05
40	SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS	196									
	Mathematics		.65	.59	.57	.38	.31	.34	.01	.03	.12
	Science		.64	.64	.55	.39	.32	.31	.07	.12	.18
	Social Studies		.66	.66	.54	.37	.32	.26	.08	.07	.18
	Reading		.62	.65	.54	.32	.34	.31	.13	.13	.23
	Listening		.59	.64	.43	.37	.19	.17	−.01	−.02	−.01
	Writing		.64	.65	.60	.28	.39	.47	.23	.14	.20
40a	SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS	91									
	Mathematics		.66	.65	.62	.32	.37	.41	.00	−.03	.18
	Science		.68	.69	.56	.38	.32	.34	.09	.07	.23

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
	Social Studies		.72	.72	.62	.31	.35	.33	.11	−.05	.19
	Reading		.69	.70	.59	.37	.38	.35	.11	.05	.28
	Listening		.61	.69	.46	.32	.27	.30	.06	−.10	−.02
	Writing		.71	.72	.64	.28	.35	.46	.19	−.05	.14
40b	SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS	105									
	Mathematics		.64	.54	.54	.43	.29	.34	.04	.12	.08
	Science		.62	.59	.56	.40	.34	.32	.07	.18	.14
	Social Studies		.62	.61	.48	.43	.33	.26	.08	.21	.18
	Reading		.57	.59	.50	.32	.28	.26	.10	.17	.16
	Listening		.59	.61	.42	.40	.18	.14	−.03	.08	.02
	Writing		.62	.61	.58	.38	.36	.42	.17	.26	.21
41	SRA ACHIEVEMENT SERIES (6-9)	92									
	Work Study Skills										
	References		.73	.69	.63	.17	.17	.27			
	Charts		.68	.65	.63	.15	.21	.20			
	Reading										
	Comprehensive		.73	.74	.57	.15	.08	.07			
	Vocabulary		.75	.72	.63	.15	.10	.14			
	Language Arts										
	Capital-Punctuation		.60	.53	.62	.33	.26	.30			
	Usage		.64	.62	.60	.34	.32	.34			
	Spelling		.59	.52	.57	.31	.32	.36			
	Arithmetic										
	Reasoning		.71	.68	.57	.07	.09	.21			
	Concepts		.69	.58	.62	.22	.07	.24			
	Computation		.79	.59	.75	.29	.26	.32			
42	SRA ADAPTABILITY TEST, FORM B	177[n]	.72	.58	.49	.35	.27	.21	.10	.26	.17
43	SRA MECHANICAL APTITUDE TEST	99									
	Mechanical Knowledge		.45	.31	.29	.53	.29	.15	.09	.27	.21
	Space Relations		.44	.13	.33	.59	.42	.19	−.08	.26	.14
	Shop Arithmetic		.63	.43	.65	.41	.34	.46	.12	.19	.04
49	STANFORD ACHIEVEMENT TEST	50									
	Paragraph Meaning		.74	.77	.64	.60	.64	.65	.37	.32	.38
	Word Meaning		.64	.71	.56	.40	.38	.50	.35	.14	.17
	Spelling		.70	.74	.64	.41	.34	.55	.28	.09	.04
	Language		.74	.77	.71	.44	.49	.59	.43	.22	.17

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
	Arithmetic Reasoning		.74	.70	.70	.49	.43	.45	.25	.29	.16
	Arithmetic Computation		.72	.72	.75	.44	.40	.53	.36	.19	.09
	Battery Median		.82	.84	.77	.54	.56	.66	.41	.27	.19
62	TESTS OF GENERAL EDUCATIONAL DEVELOPMENT	40									
	Test 1		.55	.47	.41	.39	.17	.39	.47	.03	.05
	Test 2		.48	.44	.26	.31	.18	.03	.24	−.02	−.01
	Test 3		.58	.52	.37	.32	.24	.21	.21	.05	.07
	Test 4		.60	.64	.24	.39	.20	.25	.21	−.10	−.10
	Test 5		.56	.30	.44	.35	.18	.02	.14	−.07	.05
	Mean Tests 1-5		.64	.56	.39	.41	.20	.19	.30	−.03	−.02
64	TESTS OF GENERAL EDUCATIONAL DEVELOPMENT	97									
	Mean Tests 1-5		.67								
44	WECHSLER ADULT INTELLIGENCE SCALE	69									
	Information		.68	.77	.57	.30	.27	.36	.31	−.04	.23
	Comprehension		.65	.71	.48	.35	.32	.26	.29	.05	.24
	Arithmetic		.80	.59	.74	.51	.33	.26	.22	.14	.25
	Similarities		.64	.65	.42	.38	.19	.21	.24	.07	.14
	Digit Span		.53	.44	.62	.26	.26	.40	.25	.12	.21
	Vocabulary		.68	.83	.52	.29	.17	.31	.27	−.07	.13
	Digit Symbol		.49	.47	.55	.23	.64	.57	.70	.24	.33
	Picture Completion		.54	.42	.41	.42	.47	.29	.32	.27	.36
	Block Design		.60	.40	.38	.69	.46	.14	.27	.27	.46
	Picture Arrangement		.44	.36	.27	.39	.31	.30	.24	.29	.30
	Object Assembly		.53	.43	.32	.51	.49	.18	.27	.32	.39
	Verbal I. Q.		.85	.83	.74	.44	.36	.40	.35	.09	.24
	Performance I. Q.		.72	.58	.52	.61	.61	.35	.42	.33	.46
	Full Scale I. Q.		.89	.81	.72	.57	.50	.42	.41	.21	.35
52	WECHSLER ADULT INTELLIGENCE SCALE (Total)	127									
	Verbal I. Q.		.71	.69	.60	.44	.48	.38	.33	.27	.27
	Performance I. Q.		.61	.43	.54	.56	.57	.38	.36	.41	.39
	Full Scale I. Q.		.74	.65	.64	.53	.56	.41	.37	.36	.35

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
52a	WECHSLER ADULT INTELLIGENCE SCALE	66									
	Verbal I. Q.		.71	.65	.58	.44	.53	.50	.43	.28	.37
	Performance I. Q.		.64	.40	.62	.53	.56	.43	.46	.40	.45
	Full scale I. Q.		.74	.60	.65	.52	.59	.52	.49	.36	.45
52b	WECHSLER ADULT INTELLIGENCE SCALE	61									
	Verbal I. Q.		.75	.79	.66	.44	.54	.40	.35	.30	.21
	Performance I. Q.		.61	.48	.49	.60	.66	.42	.34	.47	.36
	Full Scale I. Q.		.77	.75	.65	.55	.63	.44	.38	.40	.29
60	WECHSLER ADULT INTELLIGENCE SCALE	110									
	Verbal I. Q.		.78	.69	.72	.64	.65	.48	.52	.45	.48
	Performance I. Q.		.76	.48	.67	.74	.70	.47	.52	.54	.52
	Full Scale I. Q.		.84	.67	.76	.74	.73	.53	.58	.53	.57
61	WECHSLER ADULT INTELLIGENCE SCALE	179									
	Verbal I. Q.		.68	.74	.56	.43	.41	.45	.31	.32	.17
	Performance I. Q.		.59	.48	.50	.51	.59	.39	.41	.40	.30
	Full Scale I. Q.		.72	.70	.60	.52	.54	.48	.39	.39	.25
52	WIDE RANGE ACHIEVEMENT TEST	127									
	Reading		.58	.73	.57	.16	.39	.44			
	Spelling		.55	.68	.62	.09	.43	.55			
	Arithmetic		.71	.57	.73	.38	.53	.47			
52a	WIDE RANGE ACHIEVEMENT TEST	66									
	Reading		.60	.71	.57	.12	.38	.53			
	Spelling		.60	.71	.61	.12	.39	.59			
	Arithmetic		.67	.48	.65	.43	.62	.54			
52b	WIDE RANGE ACHIEVEMENT TEST	61									
	Reading		.53	.73	.53	.19	.32	.31			
	Spelling		.45	.60	.59	.00	.26	.33			
	Arithmetic		.75	.66	.81	.31	.44	.42			
60	WIDE RANGE ACHIEVEMENT TEST	110									
	Reading		.66	.78	.64	.33	.51	.55	.52	.28	.03
	Spelling		.68	.73	.69	.37	.56	.57	.52	.32	.39
	Arithmetic		.82	.67	.85	.58	.70	.59	.60	.54	.56

***Table 14–2. Correlations of GATB Aptitude Scores with other Tests*—Continued.**

Sample code	Test	N	Aptitudes of the GATB								
			G	V	N	S	P	Q	K	F	M
61	WIDE RANGE ACHIEVEMENT TEST	179									
	Reading		.43	.65	.35	.19	.25	.50	.24	.06	.39
	Spelling		.43	.58	.43	.22	.19	.48	.24	.06	.05
	Arithmetic		.59	.52	.63	.33	.48	.53	.28	.34	.19
46	WONDERLIC PERSONNEL TEST	114	.80	.76	.72	.46	.44	.48	.35	.21	.16
47	WONDERLIC PERSONNEL TEST	256	.79	.72	.73	.42	.24	.46	.25	.12	.03
48	WONDERLIC PERSONNEL	76	.56	.50	.40	.28	.33	.24	.12	.17	−.03

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[a] N varies from 169 to 188.
[b] N=73 for Spelling.
[c] N=146 for F & M.
[d] N=72 for F & M.
[e] N=74 for F & M.
[f] N varies from 132 to 164.
[g] N varies from 182 to 204.
[h] N=191 for F & M.
[i] N varies from 196 to 218.
[j] N=40 for K.
[k] N=48 for F & M.
[l] N varies from 162 to 181.
[m] N varies from 192 to 216.
[n] N=170 for K, F & M.

15. Reliability and Effects of Practice

Different methods for estimating the reliability of psychological tests have been described by the American Psychological Association (1966). The preferred type of estimate in a given situation is determined by factors such as the nature of the test, the purpose for which it is used, the characteristics of the individuals with whom it is used, and the availability of needed research data.

A correlation coefficient between initial test and retest scores on the same test or an equivalent form, with an intervening period of time between initial testing and retesting, may be interpreted as an indication of stability of measurement. Results of a study by Yoder and Paterson (1948) indicate that stability coefficients of some types of aptitude tests are relatively high even when the period between initial testing and retesting is as long as 10 years. A correlation coefficient between scores on different forms of the same test, administered at essentially the same time, may be interpreted as an indication of the equivalence of alternate forms.

Retesting with the same form or with an alternate form of an aptitude test usually produces an increase in scores on the second testing. This practice effect results from familiarity with test content or the testing situation gained in the initial testing. A practice effect occurs with all types of aptitude tests, and sometimes persists over long periods of time. Anastasi and Foley (1949) point out that such factors as education and test-wiseness may be related to differences between scores on initial testing and retesting. To the extent that individuals differ in the amount of improvement resulting from practice, practice effect tends to depress test reliability coefficients.

GATB reliability studies have been conducted on samples consisting of Employment Service applicants, high school and college students, employed workers, and prison inmates. The tests were administered under standard conditions, and the interval between initial testing and retesting ranged from one day to three years. In this chapter, only data on reliability of adult scores are shown. Data on reliability of scores of students, tested in lower high school grades, are shown in Chapter 20 of this Section.

Reliability studies conducted with the GATB have been directed at two types of evidence—stability of measurements over time and equivalence of forms. Some studies indicate the stability of B–1001 and Forms A and B of B–1002 with various types of samples, and with various time intervals between initial testing and retesting. Other studies indicate the equivalence of B–1001 and B–1002A, and the equivalence of Forms A and B of B–1002.

Meaningful interpretations of performance on the GATB are made in terms of the aptitudes measured (see Chapter 3 of this Section) rather than in terms of the raw test scores. Accordingly, occupational norms for the GATB have been established in terms of aptitude scores. The results shown for most of the GATB reliability studies in this chapter include means and standard deviations of aptitude scores on initial testing and retesting as well as the correlations between them. Information on the average effects of practice on GATB aptitude scores, indicated by the difference between mean scores on the first and second testing, may be useful for counselors in interpreting retest scores of individuals who have previously been tested. Also included are estimates of the standard error of measurement for GATB aptitude scores.

A summary of results of the studies reported in this chapter follows.

1. Results of studies cited in this chapter indicate that the aptitudes of the GATB are measured reliably in the types of situations in which the battery is commonly used. These

studies were conducted with samples from a variety of high school, college, and adult populations, and with intervals between initial testing and retesting ranging from one day to three years. Under these conditions, reliability coefficients for most of the aptitudes were in the range of .80 to .90. In a few studies, principally those involving adults tested and retested after brief intervals, the reliabilities of Aptitudes G, V, N, and other aptitudes sometimes exceeded .90.

2. A practice effect was consistently observed for all aptitudes. The mean score increases often exceeded 10 points for some aptitudes, a fact which should be noted by counselors who may face the problem of interpreting retest scores.

3. The reliabilities of Aptitudes F and M were generally lower than the reliabilities of the other aptitudes. Practice effect tended to be greater for Aptitudes F and M than for other aptitudes, also.

4. Test reliability was maintained and practice effects were operating when the interval between test administrations was as long as three years. Although practice effect decreased over time, it remained substantial on most aptitudes even after three years. The reliability coefficients obtained in the studies with up to three-year intervals compared favorably with the coefficients in studies conducted with much shorter intervals.

5. There was no consistent difference in the reliability of aptitudes or magnitude of the practice effect between subsamples of males and females, whether high school students, college students, or adults. Mean score increases were usually very similar for males and females, even though there were substantial differences in some studies between the initial score levels of males and females on some aptitudes.

6. In the two studies in which two forms of the GATB were administered in alternating order to equated subsamples, there was no consistent difference between the equivalence coefficients.

7. Coefficients of stability were approximately the same for Forms A and B of B–1002; they tended to be somewhat higher than coefficients of equivalence between Forms A and B. Effects of practice were more pronounced in studies in which the sample was tested both times with the same form (Form A or Form B) than in studies in which the sample was tested with one form and retested with another.

INDIVIDUAL STUDIES

Stability of B–1001

This study was conducted by the Pennsylvania Agency in 1950. The sample consists of 156 local office applicants (132 males and 24 females). The mean age of the sample was 27.8 years, with a standard deviation of 7.5 years, and a range from 18 to 45 years. The mean education of the sample was 11.4 years, with a standard deviation of 1.9 years, and a range from 6 to 17 years. The sample was tested initially and then retested after a two-week interval with B–1001.

Table 15–1 shows the means and standard deviations of scores on both testings and coefficients of stability for all aptitudes. The coefficients range from .81 (for Aptitude F) to .93 (for Aptitude N), with a median coefficient of .88. All aptitudes show practice effects over the two-week interval. Mean score increases range from 5 points (for Aptitude V) to 16 points (for Aptitude M).

Stability of B–1002, Form A

Local office applicant sample. Eight State agencies participated in this study, conducted in 1954. These States, and the number of local office applicants tested for the study in each, are as follows: Florida, 23 males and 37 females; Louisiana, 28 males and 22 females; New Jersey, 61 males and 53 females; New York, 9 males and 26 females; North Carolina, 23 males and 31 females; Pennsylvania, 50 males and 20 females; Tennessee, 18 males and 34 females; and Texas, 64 males and 23 females. The total sample of 522 consists of 276 males and 246 females.

The mean age of the male subsample was 29.4 years, with a standard deviation of 8.7 years. The mean age of the female subsample was 30.4 years, with a standard deviation of

Table 15–1. Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=156 Local Office Applicants

Aptitude	First Testing B–1001		Second Testing B–1001		r
	M	σ	M	σ	
G—Intelligence	110.9	17.0	118.3	16.9	.89
V—Verbal Aptitude	102.9	15.7	107.9	15.4	.90
N—Numerical Aptitude	109.2	17.6	115.0	17.1	.93
S—Spatial Aptitude	110.8	19.3	120.5	21.7	.87
P—Form Perception	105.9	19.4	120.2	19.9	.82
Q—Clerical Perception	97.3	18.2	110.4	21.1	.91
A—Aiming	95.7	21.7	107.6	21.8	.88
T—Motor Speed	95.5	21.3	104.8	21.9	.91
F—Finger Dexterity	102.4	20.8	117.4	22.7	.81
M—Manual Dexterity	101.9	23.1	117.9	23.3	.86

9.5 years. There was little variation among the mean ages of individuals from the various States. Ages of the total sample ranged from 16 to 62 years.

The male and female subsamples were quite similar with respect to education. The mean education of the male subsample was 12.0 years, with a standard deviation of 2.7 years. The mean education of the female subsample was 11.6 years, with a standard deviation of 2.2 years. Education of the total sample ranged from 6 to 20 years.

Individuals in the sample were tested initially and then retested after a two-week interval with the paper-and-pencil tests of B–1002, Form A. The apparatus tests, which measure Aptitudes F and M, were not administered.

Tables 15–2 and 15–3 show the means and

Table 15–2. Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=276 Male Local Office Applicants

Aptitude	First Testing B–1002, Form A		Second Testing B–1002, Form A		r
	M	σ	M	σ	
G—Intelligence	107.1	18.7	115.2	20.2	.94
V—Verbal Aptitude	104.3	18.7	110.2	21.1	.94
N—Numerical Aptitude	104.0	18.3	110.2	19.3	.93
S—Spatial Aptitude	104.7	22.2	117.0	24.0	.88
P—Form Perception	99.7	18.8	108.4	20.5	.88
Q—Clerical Perception	103.7	17.4	114.8	20.1	.86
K—Motor Coordination	100.5	19.7	109.0	20.8	.90

Table 15–3. Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=246 Female Local Office Applicants

Aptitude	First Testing B–1002, Form A		Second Testing B–1002, Form A		r
	M	σ	M	σ	
G—Intelligence	101.0	18.7	109.9	20.0	.94
V—Verbal Aptitude	104.0	19.4	110.6	20.6	.94
N—Numerical Aptitude	99.8	19.5	108.5	20.2	.87
S—Spatial Aptitude	97.0	19.1	109.1	21.2	.83
P—Form Perception	100.8	18.5	111.7	19.1	.86
Q—Clerical Perception	109.6	19.4	123.5	22.2	.89
K—Motor Coordination	107.1	17.4	117.1	17.9	.88

standard deviations of scores on both testings and coefficients of stability of the aptitudes measured by the tests administered, separately for the subsamples of males and females. The coefficients for males range from .86 (for Aptitude Q) to .94 (for Aptitudes G and V), with a median coefficient of .90. The coefficients for females range from .83 (for Aptitude S) to .94 (for Aptitudes G and V), with a median coefficient of .88. There is little difference between the reliability coefficients for males and females on any aptitude. All aptitudes show substantial practice effects for both males and females over the two-week interval. Mean score increases range from about 6 points (for both males and females on Aptitude V and males on Aptitude N) to about 14 points (for females on Aptitude Q).

High school senior sample. Seven State agencies participated in this study, which was conducted during the 1953–1954 academic year. These States, and the number of high school seniors tested for the study in each, are as follows: Indiana, 71 boys and 78 girls; Michigan, 75 boys and 75 girls; Minnesota, 150 boys and 142 girls; New York, 70 boys; North Carolina, 72 boys and 86 girls; Pennsylvania, 82 boys and 86 girls; and Wisconsin, 85 boys and 87 girls. All participating State agencies tested approximately equal numbers of boys and girls, except the New York Agency, whose sample included only boys. The total sample consists of 605 boys and 554 girls.

The mean age of the subsample of boys was 17.7 years, with a standard deviation of 0.9 years, and a range from 16 to 23 years. The mean age of the subsample of girls was 17.6 years, with a standard deviation of 0.7 years, and a range from 15 to 21 years. There was little variation among the mean ages of seniors from the various States.

Students in the sample were tested initially and then retested after a three-month interval with B–1002, Form A, during their senior years. The apparatus tests, which measure Aptitudes F and M, were not administered to the students in Michigan.

Tables 15–4 and 15–5 show the means and standard deviations of scores on both testings and coefficients of stability of all aptitudes, separately for the subsamples of boys and girls. The coefficients for boys range from .65 (for Aptitude F) to .86 (for Aptitude V), with a median coefficient of .76. The coefficients for girls range from .69 (for Aptitude F) to .89 (for Aptitude G), with a median coefficient of .80. The coefficients for girls are slightly higher than the coefficients for boys on most aptitudes. All aptitudes show practice effects for both boys and girls over the three-month interval. Mean score increases range from about 4 points (on Aptitude V) to about 18

Table 15–4. ***Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=605 Male High School Seniors***

Aptitude	First Testing B–1002, Form A		Second Testing B–1002, Form A		r
	M	σ	M	σ	
G—Intelligence	105.0	13.5	111.5	14.6	.85
V—Verbal Aptitude	98.0	12.5	102.1	13.6	.86
N—Numerical Aptitude	104.8	13.1	109.7	14.0	.82
S—Spatial Aptitude	108.0	19.0	118.6	20.8	.81
P—Form Perception	105.9	14.6	113.3	15.4	.72
Q—Clerical Perception	102.3	11.2	111.3	12.9	.74
K—Motor Coordination	100.0	16.2	109.7	16.3	.76
F—Finger Dexterity	96.1	18.2	110.6	18.7	.65
M—Manual Dexterity	104.0	20.0	122.3	20.8	.73

Note.—N=530 for Aptitudes F and M.

Table 15–5. ***Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=554 Female High School Seniors***

Aptitude	First Testing B–1002, Form A		Second Testing B–1002, Form A		r
	M	σ	M	σ	
G—Intelligence	101.9	13.9	108.8	14.6	.89
V—Verbal Aptitude	100.0	13.0	104.5	13.8	.86
N—Numerical Aptitude	103.6	14.0	109.3	14.0	.86
S—Spatial Aptitude	102.3	16.1	113.0	19.1	.80
P—Form Perception	111.5	15.6	120.0	16.6	.74
Q—Clerical Perception	113.1	13.7	123.6	15.8	.77
K—Motor Coordination	109.6	15.5	118.3	16.0	.86
F—Finger Dexterity	104.2	18.5	120.1	18.7	.69
M—Manual Dexterity	101.3	19.4	119.9	19.3	.72

Note.—N=479 for Aptitudes F and M.

points (on Aptitude M). The magnitude of the practice effect is quite similar for boys and girls on all aptitudes.

Stability of B–1002, Form B

Local office applicant sample. Five State agencies participated in this study, conducted between 1956 and 1958. These States, and the number of local office applicants tested for the study in each, are as follows: Colorado, 31 males and 31 females; Connecticut, 29 males and 38 females; Ohio, 46 males and 60 females;

Utah, 28 males; and Washington, 34 males and 26 females. All participating State agencies tested approximately equal numbers of males and females, except the Utah Agency, whose sample included only males. The total sample consists of 168 males and 155 females.

The mean age of the male subsample was 28.3 years, with a standard deviation of 10.1 years. The mean age of the female subsample was 27.0 years, with a standard deviation of 9.1 years. The male and female subsamples were similar with respect to education. The mean education of the male subsample was 12.0 years, with a standard deviation of 2.3 years. The mean education of the female subsample was 11.9 years, with a standard deviation of 1.9 years.

Individuals in the sample were tested initially and then retested after a two-week interval with the paper-and-pencil tests of B–1002, Form B. The apparatus tests, which measure Aptitudes F and M, were not administered. In addition, Part 8, which measures Aptitude K, was not administered to two males and six females in Ohio.

Tables 15–6 and 15–7 show the means and standard deviations of scores on both testings and coefficients of stability of the aptitudes measured by the tests administered, separately for the subsamples of males and females. The coefficients for males range from .86 (for Aptitudes P and Q) to .94 (for Aptitude G), with a median coefficient of .91. The coefficients for females range from .84 (for Aptitude P) to .94 (for Aptitude G), with a median coefficient of .89. There is little difference between the reliability coefficients for males and females on any aptitude. All aptitudes show substantial practice effects for both males and females over the two-week interval. Mean score increases range from about 6 points (for both males and females on Aptitude V) to about 14 points (for females on Aptitude Q).

High school senior sample. The California and Connecticut Agencies participated in this study, which was conducted during the 1956–1957 academic year. The California Agency tested 94 boys and 119 girls. All subjects were high school seniors. The total sample consists of 212 boys and 231 girls.

The mean age of the subsample of boys was 17.8 years, with a standard deviation of 0.8 years. The mean age of the subsample of girls was 17.5 years, with a standard deviation of 0.8 years.

Students in the sample were tested initially and then retested after a three-month interval with Parts 1–7 of B–1002, Form B, during their senior years. The apparatus tests, which measure Aptitudes F and M, were not adminis-

Table 15–6. Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=168 Male Local Office Applicants

Aptitude	First Testing B–1002, Form B		Second Testing B–1002, Form B		r
	M	σ	M	σ	
G—Intelligence	107.9	18.1	116.2	21.1	.94
V—Verbal Aptitude	104.4	16.4	110.0	18.5	.91
N—Numerical Aptitude	104.5	17.2	111.6	19.7	.91
S—Spatial Aptitude	109.3	20.3	119.9	22.2	.89
P—Form Perception	103.0	21.6	113.3	22.7	.86
Q—Clerical Perception	105.7	16.8	116.1	19.2	.86
K—Motor Coordination	103.2	18.4	112.6	19.8	.91

Note.—N=166 for Aptitude K.

Table 15–7. Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=155 Female Local Office Applicants

Aptitude	First Testing B-1002, Form B		Second Testing B-1002, Form B		r
	M	σ	M	σ	
G—Intelligence	102.1	19.3	109.8	20.7	.94
V—Verbal Aptitude	104.7	18.7	111.2	20.2	.93
N—Numerical Aptitude	101.7	18.5	109.2	19.7	.92
S—Spatial Aptitude	99.1	18.6	110.2	19.9	.88
P—Form Perception	107.9	18.0	118.7	19.6	.84
Q—Clerical Perception	113.4	18.8	127.1	19.8	.85
K—Motor Coordination	111.0	19.2	123.0	20.0	.89

Note.—N=149 for Aptitude K.

Table 15–8. Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=212 Male High School Seniors

Aptitude	First Testing B-1002, Form B		Second Testing B-1002, Form B		r
	M	σ	M	σ	
G—Intelligence	103.5	14.2	109.6	16.1	.87
V—Verbal Aptitude	98.5	12.9	102.1	14.2	.89
N—Numerical Aptitude	100.9	14.0	104.9	16.9	.87
S—Spatial Aptitude	110.7	17.1	122.1	20.7	.81
P—Form Perception	107.5	18.2	117.5	17.9	.70
Q—Clerical Perception	101.8	12.2	111.1	15.1	.76
K—Motor Coordination	106.9	16.8	120.9	23.4	.69

Note.—N=118 for Aptitude K.

tered in this study. Part 8, which measures Aptitude K, was administered only to the students in Connecticut.

Tables 15–8 and 15–9 show the means and standard deviations of scores on both testings and coefficients of stability of the aptitudes measured by the tests administered, separately for the sub-samples of boys and girls. The coefficients for boys range from .69 (for Aptitude K) to .89 (for Aptitude V), with a median coefficient of .81. The coefficients for girls range from .51 (for Aptitude K) to .89 (for Aptitude V), with a median coefficient of .85. All aptitudes show practice effects for both boys and girls over the three-month interval. Mean score increases range from about 4 points (for boys and girls on Aptitude V) to 14 points (for boys on Aptitude K). Magnitude of the practice effect is quite similar for boys and girls on all aptitudes.

Table 15–9. Means (M), Standard Deviations (σ), and Coefficients of Stability (r), for Aptitudes of the GATB–N=231 Female High School Seniors

Aptitude	First Testing B–1002, Form B		Second Testing B–1002, Form B		r
	M	σ	M	σ	
G—Intelligence	101.0	15.5	107.5	15.9	.87
V—Verbal Aptitude	102.2	14.7	106.5	15.1	.89
N—Numerical Aptitude	99.7	14.8	105.0	16.0	.85
S—Spatial Aptitude	103.0	16.7	113.0	19.2	.87
P—Form Perception	111.8	15.9	121.9	16.9	.72
Q—Clerical Perception	109.8	13.6	121.1	16.5	.77
K—Motor Coordination	113.2	15.3	126.2	23.4	.51

Note.—N=112 for Aptitude K.

Equivalence of B–1001 and B–1002, Form A

The Pennsylvania, Tennessee, and Utah Agencies participated in this study. The total sample consists of 585 high school seniors and college students (276 males and 309 females). For the purpose of this study, the total sample was divided into two groups with approximately equal distributions on age, sex, scholastic ability, and education.

Group I consists of 153 males and 167 females. The mean age of the group was 17.8 years, with a standard deviation of 2.3 years, and a range from 16 to 39 years. The mean education of the group was 12.1 years, with a standard deviation of 0.8 years, and a range from 11 to 17 years.

Group II had similar characteristics. This group consists of 123 males and 142 females. The mean age of the group was 17.9 years, with a standard deviation of 2.5 years, and a range from 16 to 44 years. The mean education of the group was 12.1 years, with a standard deviation of 0.7 years, and a range from 11 to 16 years.

This study involved only the separate-answer-sheet tests of B–1002, Form A (Parts 1–7) and the corresponding tests of B–1001. The experimental edition of B–1002, Form A, was used in the study. Some improvements were made in the format of the answer sheets and test booklets in the final forms of B–1002. Group I was tested initially with B–1001 and then retested with B–1002, Form A, after a two-week interval. The two batteries were administered in reverse order to Group II, also with a two-week interval.

Table 15–10 shows the coefficients of equivalence of the aptitudes measured by the tests administered, separately for Group I and Group II. Means and standard deviations of

Table 15–10. Coefficients of Equivalence for Aptitudes of the GATB–N=585 High School Seniors and College Students

Aptitude	Group I A–B Order N=320	Group II B–A Order N=265
G—Intelligence	.87	.86
V—Verbal Aptitude	.83	.81
N—Numerical Aptitude	.84	.85
S—Spatial Aptitude	.83	.78
P—Form Perception	.69	.74
Q—Clerical Perception	.70	.79

Note.—A–B Order: B–1001, followed by B–1002, Form A. B–A Order: B–1002, Form A, followed by B–1001.

aptitude scores are not available for this study. The coefficients range from .69 (for Group I on Aptitude P) to .87 (for Group I on Aptitude G), with a median coefficient of .82. There is no consistent difference between the reliabilities obtained for the two orders of administration. The coefficients of equivalence between aptitude scores on B–1001 and B–1002, Form A, obtained in this study compare favorably to the stability coefficients for aptitudes in these batteries in the studies previously cited.

Equivalence of Forms A and B of B–1002

Local office applicant sample. This study was conducted by the Pennsylvania Agency in 1954. The sample consists of 95 male and 85 female local office applicants.

The mean age of the male subsample was 27.1 years, with a standard deviation of 7.7 years, and a range from 17 to 49 years. The mean age of the female subsample was 30.0 years, with a standard deviation of 8.7 years, and a range from 17 to 53 years. The mean education of the male subsample was 11.7 years, with a standard deviation of 2.0 years, and a range from 6 to 17 years. The mean education of the female subsample was 11.5 years, with a standard deviation of 2.0 years, and a range from 6 to 16 years.

Individuals in the sample were tested initially with Parts 1–7 of B–1002, Form A, and then retested with Parts 1–7 of B–1002, Form B, after a one-week interval. Parts 9–12, which measure Aptitudes K, F, and M, and are identical in Forms A and B, were not administered.

Tables 15–11 and 15–12 show the means and standard deviations of scores on both testings and coefficients of equivalence of the aptitudes measured by the tests administered, separately for the subsamples of males and females. The coefficients for males range from .80 (for Aptitude S) to .93 (for Aptitude V), with a median coefficient of .88. The coefficients for females range from .78 (for Aptitude S) to .90 (for Aptitudes G and N), with a median coefficient of .86. There is little difference between the reliability coefficients for males and females on any aptitude. All aptidues show practice effects for both males and females over the one-week interval, although the increases are not as great as in stability studies where retesting is with the same test. Mean score increases range from about 3 to 4 points (for both males and females on Aptitudes G, V, and N) to about 10 points (for females on Aptitude Q).

High school student sample. The Maryland and Texas Agencies participated in this study. The total sample consists of 412 high school juniors and seniors (206 boys and 206 girls). For the purpose of this study, the total sample was divided into 2 groups each containing 103 boys and 103 girls with approximately equal

Table 15–11. Means (M), Standard Deviations (σ), and Coefficients of Equivalence (r), for Aptitudes of the GATB–N=95 Male Local Office Applicants

Aptitude	First Testing B–1002, Form A		Second Testing B–1002, Form B		r
	M	σ	M	σ	
G—Intelligence	108.0	15.4	112.0	17.3	.92
V—Verbal Aptitude	104.9	15.5	107.5	17.8	.93
N—Numerical Aptitude	106.3	15.3	109.4	18.5	.92
S—Spatial Aptitude	105.2	19.9	113.2	20.3	.80
P—Form Perception	102.5	16.6	107.9	19.7	.84
Q—Clerical Perception	105.0	15.4	111.7	18.0	.85

Table 15–12. Means (M), Standard Deviations (σ), and Coefficients of Equivalence (r), for Aptitudes of the GATB–N=85 Female Local Office Applicants

Aptitude	First Testing B-1002, Form A		Second Testing B-1002, Form B		r
	M	σ	M	σ	
G—Intelligence	100.2	16.5	103.3	19.8	.90
V—Verbal Aptitude	101.6	17.0	105.6	17.7	.89
N—Numerical Aptitude	100.1	17.5	104.0	20.7	.90
S—Spatial Aptitude	96.3	18.0	101.4	17.6	.78
P—Form Perception	102.4	18.4	109.1	20.3	.84
Q—Clerical Perception	109.5	19.7	119.2	21.3	.81

distributions on age, scholastic ability, and education.

The mean age of Group I was 17.0 years, with a standard deviation of 0.7 years, and a range from 15 to 20 years. The mean education of the group was 10.6 years, with a standard deviation of 0.5 years. Education, of course, ranged only from 10 to 11 years.

Group II had similar characteristics. The mean age of the group was 17.1 years, with a standard deviation of 0.7 years, and a range from 14 to 19 years. The mean education of the group was 10.6 years, with a standard deviation of 0.5 years, and a range from 10 to 11 years.

This study involved only the separate-answer-sheet tests (Parts 1–7) of Forms A and B of B–1002. The experimental editions of the two forms of B–1002 were used in the study. Some improvements were made in the format of the answer sheets and test booklets in the final forms of B–1002. Group I was tested initially with B–1002, Form A, and then retested with B–1002, Form B, after a two-week interval. The two batteries were administered in reverse order to Group II, also with a two-week interval.

Table 15–13 shows the coefficients of equivalence of the aptitudes measured by the tests administered, separately for Group I and Group II. Means and standard deviations of aptitude scores are not available for this study.

Table 15–13. Coefficients of Equivalence for Aptitudes of the GATB–N=412 High School Juniors and Seniors

Aptitude	Group I A–B Order N=206	Group II B–A Order N=206
G—Intelligence	.88	.87
V—Verbal Aptitude	.85	.84
N—Numerical Aptitude	.85	.84
S—Spatial Aptitude	.83	.82
P—Form Perception	.81	.72
Q—Clerical Perception	.80	.77

Note.—A-B Order: B–1002, Form A, followed by B–1002, Form B. B-A Order: B–1002, Form B, followed by B–1002, Form A.

The coefficients range from .72 (for Group II on Aptitude P) to .88 (for Group I on Aptitude G), with a median coefficient of .84. There are no substantial differences between the reliabilities obtained for the two orders of administration. The coefficients of equivalence between aptitude scores on B–1002, Form A, and B–1002, Form B, obtained in this study compare favorably with the stability coefficients for aptitudes in these batteries in the studies previously cited.

Short Range Reliability and Practice Effects Study

This study was conducted in 1965–66 to obtain evidence of the reliability and average effects of practice for the aptitudes of the GATB when the intervals between initial and retesting vary from one day to six months.

Sixteen State agencies participated in the study, collecting data on State employees, local office applicants and inmates of several penal institutions. No individual in the sample was receiving any academic or other kind of training during the period covered by the study and none had taken the GATB prior to participating in the study. At each testing location, those initially tested were divided into subsamples A, B, C, D and E, which were equated as closely as possible with respect to age, education, and sex.

The five subsamples were tested initially with the GATB, B–1002A during the period May 1 to July 31, 1965, then retested with an alternate form (GATB, B–1002B) after intervals of one day, two weeks, six weeks, thirteen weeks, and twenty-six weeks, respectively. Of the 2,303 initially tested, 1,705 were available for retest and were included in the final sample.

Table 15–14 shows the number of cases (male, female, total) in each of the subsamples by State. Table 15–15 shows the means and standard deviations for age and education for each subsample by sex. The subsamples appear to be quite comparable with respect to these basic characteristics.

Table 15–16 shows the means and standard deviations of the nine GATB aptitudes for the five subsamples. Initial aptitude performance is quite similar for the various subsamples. Table 15–17 indicates the aptitude reliability (initial test-retest) coefficients for each of the five subsamples. There is no evidence of deterioration in size of correlation between initial testing and retesting over the time intervals included in the study. There are no consistent differences in the reliability coefficients of males and females.

Table 15–18 shows the increases in mean aptitude scores between initial testing and retesting. Tests of differences between correlated means show that nearly all of the indicated increases in mean score are significant at the .05 level or greater. Lack of significant mean score differences, however, were noted for: Subsample C on Aptitudes G, V (both sexes), and N (males only); and Subsample E on Aptitudes G (females only), V and N (both sexes).

The data in Table 15–18 suggest that there is a general decline in mean test score difference as the time interval between initial test and retest becomes longer. An analysis of covariance was performed to determine whether length of time interval is a factor in mean score gain between subsamples (males and females combined). The results are shown in Table 15–19, which indicates significant differences for all of the GATB aptitudes. Thus, length of time between testings is a significant factor in the amount of gain for all aptitudes.

Long-Range Reliability and Practice Effects Study

Seventeen State agencies participated in this study which was conducted in 1959–62 to obtain evidence of the reliability and average effects of practice for the aptitudes of the GATB when the intervals between initial testing and retesting are one, two, and three years, respectively. The sample consisted of individuals between 25 and 34 years of age at the time of initial testing. The age range 25–34 was chosen because it represents the interval during which the effects of maturation and aging upon GATB aptitude scores appear to be minimal (see Chapter 18 of this Section). Most of the individuals in the sample were employees in local or State employment security offices. Some additional subjects tested for the study were employed in other State government agencies and field offices of U.S. Government agencies. No person who had taken the GATB or was familiar with it was included in the sample. At each testing location those initially tested were divided into Subsamples A, B and C at the time of testing. The three subsamples were tested initially with the GATB, B–1002B during the same one-month period before June 30, 1959, then retested with an alternate form (GATB, B–1002A) after intervals of

Table 15–14. Number of Cases (Male, Female, Total) in the Subsamples for the Short-Range Reliability and Practice Effects Study by State
Local Office Applicants, Employed Workers, and Prison Inmates

State	Subsample A			Subsample B			Subsample C			Subsample D			Subsample E		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Alabama	2	8	10	2	10	12	2	8	10	2	4	6	4	4	8
California	16	23	39	16	21	37	6	23	29	12	21	33	15	19	34
Colorado	42	—	42	37	—	37	39	—	39	36	—	36	34	—	34
Connecticut	19	14	33	15	16	31	17	16	33	17	17	34	15	9	24
Florida	5	19	24	7	13	20	7	14	21	3	12	15	2	13	15
Illinois	2	7	9	3	7	10	2	5	7	3	5	8	3	7	10
Iowa	12	8	20	7	2	9	—	6	6	5	6	11	2	6	8
Louisiana	17	—	17	15	—	15	9	—	9	9	—	9	8	—	8
Michigan	29	2	31	29	—	29	18	—	18	30	—	30	23	—	23
Mississippi	12	17	29	10	19	29	3	14	17	1	9	10	2	10	12
Nebraska	6	—	6	6	—	6	6	—	6	6	—	6	5	—	5
New Jersey	8	16	24	6	11	17	—	20	20	4	15	19	5	14	19
New York	10	11	21	12	10	22	8	13	21	7	15	22	8	10	18
Pennsylvania	22	26	48	24	20	44	25	22	47	25	22	47	17	24	41
Texas	10	7	17	7	9	16	12	10	22	13	10	23	11	15	26
Washington	11	28	39	6	14	20	2	17	19	3	13	16	3	5	8
Totals	223	186	409	202	152	354	156	168	324	176	149	325	157	136	293

Table 15–15. Means (M) and Standard Deviations (σ) for Age and Education at Initial Testing for the Subsamples in the Short-Range Reliability and Practice Effects Study

Samples & Intervals	Males				Females			
	Age		Education		Age		Education	
	M	σ	M	σ	M	σ	M	σ
A= 1 Day	31.8	8.8	12.0	2.9	32.0	9.7	12.5	1.4
B=2 Weeks	32.4	8.9	12.2	2.7	31.7	9.2	12.4	1.9
C=6 Weeks	32.7	7.7	11.8	2.7	32.1	9.6	12.4	1.8
D=13 Weeks	32.8	8.1	11.9	2.7	32.8	9.8	12.3	2.1
E=26 Weeks	32.2	8.1	12.4	2.8	31.4	8.9	12.6	1.8

Table 15–16. Means (M) and Standard Deviations (σ) of GATB Aptitudes at Initial Testing and Retesting for the Subsamples in the Short-Range Reliability and Practice Effects Study (See Table 15–14 for Number of Cases)

Time Interval		First Testing B-1002, Form A				Second Testing B-1002, Form B			
		Male		Female		Male		Female	
		M	σ	M	σ	M	σ	M	σ
1 day	G	102.9	19.8	103.3	16.9	107.8	21.0	107.3	19.0
	V	102.5	18.0	105.9	17.4	105.6	18.9	108.8	18.0
	N	101.2	21.1	103.2	17.1	105.6	23.3	109.0	19.8
	S	102.1	21.2	96.1	16.9	109.6	20.8	102.5	17.6
	P	100.6	19.4	105.7	18.3	110.2	23.1	116.4	23.2
	Q	109.9	17.5	115.5	18.7	118.4	20.6	127.6	20.8
	K	103.3	21.1	116.3	20.1	112.4	22.4	126.6	20.9
	F	96.5	24.6	100.4	20.4	111.1	24.5	114.8	20.7
	M	102.9	24.4	101.5	22.5	116.7	25.4	115.3	23.7
2 wks.	G	104.7	17.8	101.3	16.5	107.1	19.2	104.2	19.7
	V	103.6	18.0	104.9	17.5	105.4	18.5	108.4	18.7
	N	102.2	18.2	101.9	17.8	105.0	20.2	104.8	20.2
	S	104.5	19.2	94.6	16.4	110.5	19.7	100.5	17.6
	P	102.0	19.4	107.7	18.6	109.8	23.8	114.8	22.5
	Q	110.6	17.8	116.2	17.6	119.9	22.5	126.2	20.7
	K	102.8	23.6	109.7	19.2	111.1	25.1	120.3	19.2
	F	94.1	21.3	97.8	22.1	105.0	22.6	110.2	24.0
	M	99.3	22.0	98.2	24.4	111.2	23.0	110.4	25.3
6 wks.	G	105.3	19.1	103.3	17.5	105.6	21.2	103.9	20.4
	V	103.0	17.3	106.4	17.5	103.6	18.3	107.1	19.0
	N	103.6	21.6	102.7	17.6	103.9	24.8	104.4	20.6
	S	103.6	21.1	98.6	18.1	107.6	20.2	102.9	18.3
	P	104.2	20.3	105.3	21.0	108.4	24.0	112.3	21.0
	Q	110.7	20.1	116.1	19.3	116.9	22.7	126.9	21.7
	K	101.2	21.6	111.6	18.5	109.7	24.0	120.4	19.3
	F	94.1	22.0	97.8	21.4	108.4	22.8	110.7	19.9
	M	98.6	24.5	100.5	18.5	106.2	28.1	111.8	19.8
13 wks.	G	103.8	17.8	103.9	17.8	105.9	18.8	107.3	20.8
	V	101.5	17.0	107.5	17.6	103.3	18.0	110.4	18.0
	N	101.4	19.0	104.0	19.5	103.8	20.3	107.9	23.6
	S	103.6	20.0	97.3	18.7	109.3	19.6	102.9	19.7
	P	103.1	18.3	107.6	19.2	109.6	21.9	113.9	20.8
	Q	110.0	17.0	118.3	17.9	115.7	19.8	129.7	20.6
	K	101.2	20.2	114.8	19.3	106.5	21.1	122.7	20.0
	F	95.5	22.0	100.7	19.9	104.6	23.5	108.9	22.4
	M	104.3	21.6	102.7	22.1	111.4	23.6	109.6	23.8

Table 15–16. *Means (M) and Standard Deviations (σ) of GATB Aptitudes at Initial Testing and Retesting for the Subsamples in the Short-Range Reliability and Practice Effects Study (See Table 15–14 for Number of Cases)*–Continued.

Time Interval		First Testing B-1002, Form A				Second Testing B-1002, Form B			
		Male		Female		Male		Female	
		M	σ	M	σ	M	σ	M	σ
26 wks.	G	105.4	20.0	103.7	19.0	107.6	20.7	104.8	21.5
	V	104.7	19.0	105.9	18.2	105.7	19.5	106.5	19.1
	N	104.3	20.0	104.0	18.4	104.7	22.6	105.2	21.9
	S	102.7	21.1	100.2	20.2	107.0	20.3	102.9	20.1
	P	103.1	19.0	106.4	22.6	108.3	20.4	113.6	24.0
	Q	112.6	19.3	116.8	19.2	117.8	18.6	125.7	21.8
	K	102.0	22.2	112.2	20.4	108.0	23.6	117.7	22.4
	F	97.0	21.2	101.5	21.0	103.9	22.2	110.4	21.7
	M	104.1	21.5	100.1	22.7	111.7	22.1	107.5	20.9

Table 15–17. *Stability Coefficients for Subsamples in the Short-Range Reliability and Practice Effects Study (Based on Initial Test-Retest with Alternate Forms B–1002A and B, Respectively)*

Aptitude	Intervals between Test and Retest				
	1 Day	2 Weeks	6 Weeks	13 Weeks	26 Weeks
G—Intelligence					
Males	.94	.92	.93	.90	.94
Females	.91	.92	.90	.91	.94
V—Verbal Aptitude					
Males	.88	.88	.90	.86	.90
Females	.85	.90	.87	.87	.89
N—Numerical Aptitude					
Males	.94	.92	.95	.93	.94
Females	.92	.94	.90	.91	.92
S—Spatial Aptitude					
Males	.86	.84	.88	.81	.87
Females	.81	.73	.78	.83	.82
P—Form Perception					
Males	.86	.84	.84	.83	.81
Females	.84	.86	.80	.77	.84
Q—Clerical Perception					
Males	.84	.83	.87	.86	.76
Females	.85	.77	.84	.80	.82
K—Motor Coordination					
Males	.90	.94	.88	.88	.90
Females	.89	.83	.88	.92	.91

***Table 15–17. Stability Coefficients for Subsamples in the Short-Range Reliability and Practice Effects Study (Based on Initial Test-Retest with Alternate Forms B–1002A and B, Respectively)*—Continued.**

Aptitude	Intervals between Test and Retest				
	1 Day	2 Weeks	6 Weeks	13 Weeks	26 Weeks
F—Finger Dexterity					
Males	.79	.72	.73	.65	.69
Females	.75	.80	.67	.72	.71
M—Manual Dexterity					
Males	.81	.73	.84	.79	.75
Females	.88	.84	.72	.80	.70

one, two and three years, respectively. Of the 1,309 initially tested 896 were available for retest and were included in the final sample. Table 15–20 shows the number of individuals tested for the three phases of the study in each State.

Table 15–21 shows data on age and education by sex for each of the three subsamples. Note that they are quite comparable with regard to these basic characteristics.

For each sex, Table 15–22 shows the means and standard deviations of GATB aptitude scores for the three subsamples and Table 15–23 shows the aptitude reliability (initial test-retest) coefficients for the three subsam- dence of deterioration in the size of the relationship between initial testing and retesting ples. The data in Table 15–23 show no evi- for any of the aptitudes over the time period covered by this study. Another point of inter-

Table 15–18. Increases in GATB Aptitude Mean Scores for Subsamples A (1-Day Interval), B (2-Week Interval), C (6-Week Interval), D (13-Week Interval), and E (26-Week Interval)

Aptitude	Intervals between Test and Retest				
	1 Day	2 Weeks	6 Weeks	13 Weeks	26 Weeks
G—Intelligence					
Males	4.9	2.4	.3	2.1	2.2
Females	4.0	2.9	.6	3.4	1.1
V—Verbal Aptitude					
Males	3.1	1.8	.6	1.8	1.0
Females	2.9	3.5	.7	2.9	.6
N—Numerical Aptitude					
Males	4.4	2.8	.3	2.4	.4
Females	5.8	2.9	1.7	3.9	1.2
S—Spatial Aptitude					
Males	7.5	6.0	4.0	5.7	4.3
Females	6.4	5.9	4.3	5.6	2.7

Table 15–18. *Increases in GATB Aptitude Mean Scores for Subsamples A (1-Day Interval), B (2-Week Interval), C (6-Week Interval), D (13-Week Interval), and E (26-Week Interval)*— Continued.

Aptitude	Intervals between Test and Retest				
	1 Day	2 Weeks	6 Weeks	13 Weeks	26 Weeks
P—Form Perception					
Males	9.6	7.8	4.2	6.5	5.2
Females	10.7	7.1	7.0	6.3	7.2
Q—Clerical Perception					
Males	8.5	9.3	6.2	5.7	5.2
Females	12.1	10.0	10.8	11.4	8.9
K—Motor Coordination					
Males	9.1	8.3	8.5	5.3	6.0
Females	10.3	10.6	8.8	7.9	5.5
F—Finger Dexterity					
Males	14.6	10.9	14.3	9.1	6.9
Females	14.4	12.4	12.9	8.2	8.9
M—Manual Dexterity					
Males	13.8	11.9	7.6	7.1	7.6
Females	13.8	12.2	11.3	6.3	7.4

Table 15–19. *Analysis-of-Covariance Results for the Short-Range Reliability and Practice Effects Study*

Aptitude	Mean Square		F
	Error (df=1,699)	Interval (df=4)	
G—Intelligence	62.81	805.61	12.83**
V—Verbal Aptitude	77.67	369.46	4.76**
N—Numerical Aptitude	67.13	1,106.84	16.49**
S—Spatial Aptitude	118.12	551.20	4.67**
P—Form Perception	159.43	1,110.61	6.97**
Q—Clerical Perception	144.20	500.47	3.47**
K—Motor Coordination	95.11	991.18	10.42**
F—Finger Dexterity	239.66	2,657.08	11.09**
M—Manual Dexterity	563.77	2,992.75	5.31**

**Significant at the .01 level.

Table 15–20. Number of Cases (Male, Female, Total) in the Subsamples for the Long-Range Reliability and Practice Effects Study by State-Employed Workers

State	Subsample A			Subsample B			Subsample C		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
California	11	23	34	11	24	35	14	24	38
Colorado	3	—	3	2	1	3	4	—	4
Connecticut	3	4	7	5	2	7	3	1	4
Florida	7	9	16	6	9	15	6	6	12
Illinois	5	12	17	8	10	18	6	11	17
Michigan	12	19	31	11	20	31	11	17	28
Minnesota	20	10	30	14	5	19	14	2	16
New Jersey	14	30	44	13	20	33	10	34	44
North Carolina	6	16	22	4	14	18	4	14	18
Ohio	—	—	—	—	—	—	2	7	9
Pennsylvania	6	19	25	10	17	27	13	13	26
Rhode Island	1	11	12	2	10	12	2	13	15
South Carolina	3	7	10	4	7	11	2	10	12
Tennessee	1	7	8	2	9	11	1	7	8
Texas	15	11	26	18	15	33	18	18	36
Utah	11	5	16	8	7	15	13	6	19
Washington	1	—	1	—	—	—	—	—	—
Totals	119	183	302	118	170	288	123	183	306

Table 15–21. Means (M) and Standard Deviations (σ) for Age and Education at Initial Testing for Subsamples in the Long-Range Reliability and Practice Effects Study

Samples & Intervals	Males				Females			
	Age		Education		Age		Education	
	M	σ	M	σ	M	σ	M	σ
A=1 Year	29.5	3.0	14.6	2.1	30.0	3.0	12.5	1.2
B=2 Years	29.6	3.0	14.5	2.1	29.8	2.9	12.4	1.4
C=3 Years	30.0	2.8	13.9	2.1	30.6	2.7	12.4	1.3

Table 15–22. Means (M) and Standard Deviations (σ) of GATB Aptitudes at Initial Testing and Retesting for the Subsamples in the Long-Range Reliability and Practice Effects Study (See Table 15–19 for Numbers of Cases)

Time Interval		First Testing B-1002, Form B				Second Testing B-1002, Form A			
		Male		Female		Male		Female	
		M	σ	M	σ	M	σ	M	σ
	G	117.7	17.0	105.3	16.4	120.8	15.8	109.7	14.8
	V	115.8	16.8	107.4	17.2	118.0	17.0	111.5	15.9
	N	113.4	15.8	106.8	15.9	115.2	14.2	111.3	15.1
1 year	S	112.6	17.4	99.8	18.3	117.5	21.3	103.6	19.4
	P	109.2	19.3	109.0	18.6	110.5	18.0	112.1	17.2
	Q	117.1	15.8	120.4	16.0	121.2	15.8	127.6	15.9
	K	115.4	18.6	117.8	17.2	122.2	19.2	125.4	16.1
	F	99.4	21.3	104.4	21.0	106.0	20.5	114.1	21.2
	M	106.9	22.1	102.6	21.5	113.3	22.5	108.7	22.8
	G	117.5	15.7	103.5	15.4	121.2	15.6	107.0	15.1
	V	114.1	16.9	105.9	16.0	116.9	17.0	109.0	15.9
	N	115.1	16.6	106.5	15.1	118.2	14.6	109.9	13.9
2 years	S	112.3	17.7	96.5	17.9	116.9	21.8	100.2	19.5
	P	109.4	18.3	109.2	16.9	112.3	17.8	112.2	16.0
	Q	117.4	16.4	120.3	16.8	120.7	15.6	126.3	18.0
	K	112.9	17.3	117.6	16.2	120.1	16.8	123.3	18.7
	F	95.0	19.6	103.9	22.1	105.6	21.9	112.5	22.4
	M	103.2	21.0	102.3	21.4	114.0	22.2	112.8	24.6
	G	114.4	18.5	100.9	15.4	118.5	17.8	105.5	15.1
	V	110.4	16.4	104.4	15.1	115.2	17.4	109.2	15.9
	N	112.4	17.7	102.0	15.8	114.7	16.1	105.7	13.9
3 years	S	111.4	20.3	96.1	16.6	114.4	22.0	100.3	18.1
	P	109.1	16.7	105.8	16.0	111.7	16.6	109.5	15.5
	Q	114.6	15.2	117.6	15.4	117.0	14.7	122.0	15.1
	K	111.3	20.3	117.4	16.6	115.9	20.4	121.4	16.4
	F	99.1	21.8	103.3	18.8	104.7	21.0	108.5	20.8
	M	107.9	24.8	99.5	19.8	115.9	22.9	105.6	20.4

est is that the reliability coefficients from this study compare quite favorably with reliability coefficients for similar samples for which the interval between testings was considerably less than one year.

Table 15–24 shows the increases in aptitude mean scores between initial testing and retesting. Tests of differences between correlated means indicate that all of these increases are significant at the .05 level or greater, with the exception of the mean score difference on Aptitude P for males in Subsample A (retested at the end of one year). Thus, effects of practice appear to be operating for all aptitudes even

Table 15–23. Stability Coefficients for the Subsamples in the Long-Range Reliability and Practice Effects Study (Based on Initial Test-Retest with Alternate Forms B–1002B and A, Respectively)

Aptitude	Intervals between Test and Retest		
	1 year	2 years	3 years
G—Intelligence			
Males	.88	.80	.91
Females	.88	.84	.86
V—Verbal Aptitude			
Males	.84	.85	.90
Females	.85	.87	.80
N—Numerical Aptitude			
Males	.84	.87	.90
Females	.82	.86	.84
S—Spatial Aptitude			
Males	.80	.75	.85
Females	.82	.75	.79
P—Form Perception			
Males	.85	.70	.76
Females	.73	.78	.75
Q—Clerical Perception			
Males	.78	.76	.76
Females	.71	.77	.73
K—Motor Coordination			
Males	.88	.82	.89
Females	.84	.88	.88
F—Finger Dexterity			
Males	.79	.64	.79
Females	.74	.71	.68
M—Manual Dexterity			
Males	.80	.70	.82
Females	.73	.73	.75

when the interval between initial testing and retesting is as long as three years.

An analysis of covariance was performed to determine whether length of time interval is a factor in mean score gain between subsamples (males and females combined). For each aptitude an F test was made of homogeneity of within-class regression. Significant differences among the three regression coefficients were not found for any of the nine aptitudes, indicating no evidence for heterogeneity of regression for the three samples. Table 15–25 shows the results of the covariance analysis, the F ratio providing the test of the hypothesis that there is no difference in retest means after the data have been adjusted for the initial level.

Significant differences were obtained for Clerical Perception (Q), Motor Coordination (K), Finger Dexterity (F), and Manual Dexterity (M), indicating that length of interval between initial testing and retesting is a factor in the amount of increase in mean scores for

Table 15–24. Increases in GATB Mean Scores for Subsamples A (1-year Interval), B (2-year Interval), and C (3-year Interval)

Aptitude	Intervals between Test and Retest		
	1 year	2 years	3 years
G—Intelligence			
Males	3.0	3.8	4.1
Females	4.3	3.5	4.6
V—Verbal Aptitude			
Males	2.2	2.8	4.7
Females	4.1	3.1	4.8
N—Numerical Aptitude			
Males	1.8	3.0	2.3
Females	4.5	3.4	3.7
S—Spatial Aptitude			
Males	4.9	4.6	3.0
Females	3.8	3.7	4.3
P—Form Perception			
Males	1.3	2.9	2.6
Females	3.1	3.1	3.7
Q—Clerical Perception			
Males	4.1	3.3	2.4
Females	7.3	6.0	4.4
K—Motor Coordination			
Males	6.8	7.3	4.6
Females	7.6	5.7	4.0
F—Finger Dexterity			
Males	6.6	10.6	5.6
Females	9.8	8.6	5.2
M—Manual Dexterity			
Males	6.4	10.8	8.0
Females	6.1	10.5	6.1

these aptitudes. For the remaining aptitudes, there is no evidence that, within the time span for this study, length of interval between testings is a factor influencing practice effects.

The gain in score on a particular aptitude may also be related to variables such as age, education, or scores on other aptitudes. For example, in a study reported by Abbey (1962) it was found that age was a factor in the effects of practice on the Toronto Complex Coordinator, a perceptual-motor task. On the other hand, Vernon (1954) summarizing research done on effects of practice on intelligence test scores, reported that there was evidence that gain in test scores upon retesting was substantially the same for different age groups.

Analyses were made on Subsample A to determine the extent to which amount of gain in scores on two of the GATB aptitudes were related to other variables. In obtaining these relationships, the technique of part correlation (DuBois, 1957) was used. Application of this technique results in the correlation between an unmodified outside variable, such as age, with

Table 15–25. Analysis-of-Covariance Results for the Long-Range Reliability and Practice Effects Study

Aptitude	Mean Square		F
	Error (df=892)	Interval (df=2)	
G—Intelligence	62.99	14.50	.23
V—Verbal Aptitude	19.94	1,539.50	1.98
N—Numerical Aptitude	58.76	96.50	1.64
S—Spatial Aptitude	14.19	3.00	.21
P—Form Perception	119.54	30.50	.26
Q—Clerical Perception	93.07	594.00	6.38*
K—Motor Coordination	21.62	221.50	10.24**
F—Finger Dexterity	221.01	1,265.50	5.72*
M—Manual Dexterity	224.90	1,457.50	6.48*

*Significant at the .05 level.
**Significant at the .01 level.
Note.—For convenience, analysis was based on raw scores for Aptitudes (V, S, Q, K) measured by only one test.

the residual gain in scores on the aptitude under consideration. The residual gain represents the difference between actual final aptitude score and final score predicted from initial score. Age, education, and initial scores on Aptitude G (General Learning Ability) were correlated with residual gain on Aptitude M (Manual Dexterity). None of these correlations was significant. Age, education, initial scores on Aptitude M (Manual Dexterity) and Clerical Perception (Aptitude Q) were correlated with residual gain on Aptitude G (General Learning Ability). None of these correlations was significant. Thus, although only limited analyses were made, there was no evidence that residual gain is related to other variables. Further analyses of this type are required before making more definite conclusions and generalizing to aptitudes other than Aptitudes G and M.

Discussion. Although there are significant increases in scores upon retesting after one, two or three years for all aptitudes, there is no evidence of deterioration in reliability of measurement over the time span studied. This finding, together with the fact that the obtained reliability coefficients compare favorably with those in similar studies with a shorter interval between testings, has a practical implication. That is, retesting an individual with aptitude tests will generally be unnecessary *unless* he is exposed to training or experience that would be likely to affect his aptitudes.

The influence of factors such as training, experience, etc., in the results cannot be ruled out entirely even though an attempt was made to restrict the sample to those not receiving formal training. An unpublished study by Jerome Moss, Jr., of the University of Minnesota indicates that experience and training may be more important than practice in samples exposed to significant training or new experience related to the aptitude test tasks.

STANDARD ERROR OF MEASUREMENT FOR GATB APTITUDES

The reliability coefficient provides information regarding the accuracy of a test as a whole; the standard error of measurement provides information about the accuracy of an *individual score* on the test. Due to the influence of chance factors, an examinee's score on a test will tend to fluctuate over repeated testings using alternate forms. In theory, the average of his scores over a large number of test trails, with appropriate adjustments for the effects of practice, etc., represents his "true" score on the test in question. In practice, the examinee's true score is unknown. However, given his obtained score and the standard error of measurement, we can calculate a range of scores or "band" within which the examinee's true score is likely to be located. The standard error of measurement (σ_{meas}) may be computed from the following formula:

$$\sigma_{meas} = \sigma\sqrt{1 - r_{tt}}$$

r_{tt} = reliability coefficient of aptitude scores

where: σ = standard deviation of aptitude measure

Standard errors of measurement for the nine aptitudes of the GATB have been computed and are shown in Table 15–26. They are based on the standard deviations of initial test scores and the stability coefficients for each of the subsamples in the Short and Long-Range Reliability and Practice Effect Studies.

In general, the subsample values in Table 15–26 are quite similar. The medians, based on subsamples retested in less than one year, are: G–6, V–6, N–6, S–8, P–9, Q–9, K–7, F–12 and M–11. These values form the basis for computing confidence bands for use with the *GATB Indicator*, a form for reporting test results in terms of aptitude score ranges rather than obtained scores. (See Chapter 22 of this Section.) A confidence band is computed by adding to and subtracting from an individual's obtained score the number of score points corresponding to the standard error of measurement. For example, if a person's obtained score on Aptitude G is 120, the confidence band is the range between 114 and 126 (120±6). The true scores of about two-thirds of all individuals tested will fall within the confidence intervals formed by adding and subtracting one standard error of measurement from their respective obtained scores.

PRACTICE EFFECT TRENDS IN GATB APTITUDE SCORES

Tables 15–18 and 15–24 show the obtained increases in aptitude mean scores due to practice effect for time intervals ranging from one day to three years. Analysis-of-covariance results for these data (Tables 15–19 and 15–25) indicate that time interval is a factor in size of practice effect for *all* aptitudes when the interval is between one day and six months, and for Aptitudes Q, K, F and M when the interval is between one year and three years. These findings indicate (1) evidence of initial decline in practice effect for all aptitudes, (2) a leveling off trend for Aptitudes G, V, N, S and P, and (3) no leveling off in trend for Aptitudes Q, K, F and M. To better visualize these trends, smooth curves were prepared to represent the obtained mean-score increases between initial testing and retesting for the eight subsamples in the two practice effect studies. The mean-score increases, as estimated from the smoothed curves, are shown in Table 15–27.

For Aptitudes G, V, N, S and P, the initial decline in practice effect continues to a point where the interval between initial testing and retesting is about six weeks. Thereafter, practice effect remains relatively constant for periods up to, and probably beyond, three years. For the remaining Aptitudes (Q, K, F and M) there is also an initial downward trend, but one which continues at a slow rate of decline throughout the entire three-year period.

The GATB Longitudinal Maturation Study provides some indirect evidence of practice effect (see Chapter 20 of this Section). In this study, the grade 12 *retest* scores of samples of high school students initially tested in grades 11, 10 and 9 were compared with the scores of a control group of students who were tested *only* in grade 12. The differences in aptitude means (Table 20–4 of Chapter 20) represent estimates of practice effects after intervals of 1, 2 and 3 years, respectively. For Aptitudes G, V, N, P and Q the 1-, 2- and 3-year practice effect increments are quite similar to those established in the adult studies. For the remaining Aptitudes (S, K, F and M) the differences in practice effect increment for the 1-, 2- and 3-year intervals ranged from two to five points.

The practice effect results from the adult studies were probably more valid than those

Table 15–26. Standard Errors of Measurement for GATB Aptitude Scores (Based on the Stability Coefficients and Initial-Test Standard Deviations for the Short and Long-Range Reliability and Practice Effects Studies)

Males

Aptitude	Interval							
	One Day (N = 223)	2 Wks (N = 202)	6 Wks (N = 156)	13 Wks (N = 176)	26 Wks (N = 157)	1 Year (N = 119)	2 Year (N = 118)	3 Year (N = 123)
G—Intelligence	5.3	5.6	5.5	6.1	5.2	5.4	7.2	5.4
V—Verbal Aptitude	6.6	6.3	5.7	6.6	6.3	6.9	6.5	5.4
N—Numerical Aptitude	5.8	5.8	5.7	5.5	5.3	5.7	5.2	5.1
S—Spatial Aptitude	7.8	7.8	7.1	8.5	7.2	9.6	10.9	8.5
P—Form Perception	8.7	9.6	9.6	9.0	8.8	7.0	9.8	8.1
Q—Clerical Perception	8.3	9.3	8.1	7.3	9.1	7.4	7.7	7.3
K—Motor Coordination	7.2	5.9	8.4	7.5	7.4	6.8	7.2	6.7
F—Finger Dexterity	11.2	12.0	11.7	13.9	12.4	9.3	13.3	9.6
M—Manual Dexterity	11.2	11.9	11.1	10.8	11.1	10.0	12.2	9.8

Females

Aptitude	Interval							
	One Day (N = 186)	2 Wks (N = 152)	6 Wks (N = 168)	13 Wks (N = 149)	26 Wks (N = 136)	1 Year (N = 183)	2 Year (N = 170)	3 Year (N = 183)
G—Intelligence	5.6	5.5	6.6	6.3	5.4	5.1	6.0	5.6
V—Verbal Aptitude	6.9	5.9	7.0	6.4	6.2	6.2	5.8	7.2
N—Numerical Aptitude	5.7	5.1	6.5	7.1	6.4	6.5	5.2	5.5
S—Spatial Aptitude	7.6	9.1	8.5	8.2	8.6	8.2	9.8	8.4
P—Form Perception	9.3	8.5	9.3	10.0	9.7	8.9	7.6	7.8
Q—Clerical Perception	7.9	10.0	8.7	9.2	9.2	8.6	8.6	7.9
K—Motor Coordination	6.8	8.0	6.8	5.5	6.6	6.5	6.5	5.7
F—Finger Dexterity	10.4	10.9	11.4	11.9	11.7	10.9	12.0	11.8
M—Manual Dexterity	8.1	10.3	10.5	10.6	11.4	11.8	12.8	10.3

from the maturation study for the following reasons:

1. The adult studies were based on initial test and retest scores of the same individuals rather than different groups of individuals.

2. The aptitude stability coefficients obtained from the adult practice effect studies were generally higher than those obtained for high school students in the maturation study.

In general, the practice effect is not sufficiently greater than the standard error of measurement to warrant adjustments in retest scores of individuals. Hence the employment service makes no adjustments in retest scores

Table 15–27. Increases in GATB Aptitude Mean Scores for Time Intervals in Short- and Long-Range Reliability and Practice Effect Studies Based on Smoothed Curves

Aptitude	Interval Between Initial Test and Retest							
	1 Day (N=409)	2 Weeks (N=354)	6 Weeks (N=324)	13 Weeks (N=325)	26 Weeks (N=293)	1 Year (N=302)	2 Years (N=288)	3 Years (N=306)
G—Intelligence	5.6	4.3	3.4	3.1	3.0	2.6	2.6	2.6
V—Verbal Aptitude	4.6	3.6	3.2	3.0	2.9	2.6	2.6	2.6
N—Numerical Aptitude	6.1	4.2	3.2	3.0	2.9	2.6	2.6	2.6
S—Spatial Aptitude	7.0	5.9	4.9	4.5	4.4	4.0	4.0	4.0
P—Form Perception	8.4	5.6	4.6	4.6	4.6	4.6	4.6	4.6
Q—Clerical Perception	10.8	9.8	8.9	8.4	7.4	5.4	4.4	3.3
K—Motor Coordination	12.6	11.9	10.6	9.0	8.0	4.1	3.3	2.0
F—Finger Dexterity	16.3	14.5	12.8	11.5	9.8	6.4	5.2	3.8
M—Manual Dexterity	14.9	13.2	10.6	8.2	7.7	6.8	6.7	6.5

for the effects of practice. Most of the retesting is done with disadvantaged persons whose scores are affected by lack of exposure to tests and the uncorrected retest score might be a better estimate of the true score than a corrected retest score for such persons.

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16. Effect of Training on Aptitude Scores

OCCUPATIONAL TRAINING

Some supervisors of employed workers have remarked that the aptitude scores workers make before entering training or a job bear no relationships to subsequent job performance, and consequently they are unwilling to apply test norms to applicants when such norms have been developed on employed workers. They believe that the employed workers acquired the abilities from training received on the job and that new workers could acquire the same abilites from training received on the job. However, studies conducted by the United States Training and Employment Service have shown that test norms developed on employed workers are selective when check studies have been conducted on applicants, using the longitudinal design, For example, GATB norms were established for the occupation of machinist based on a study of employed workers who had successfully survived the training period in that occupation. Subsequently, these norms were checked on a cross validation sample by administering the GATB to a group of individuals at the time of entering training for the occupation of machinist. Test results were not used in screening applicants for the training course. The validity coefficient (phi coefficient) for these norms when applied to the cross validation group was .52, significant at the .001 level. Thus, we see that test norms which were established on a group of employed workers also have predictive value when they are subsequently applied to a sample of applicants for employment in the same occupation. For other studies of this kind, see Chapter 9 of this Section.

A more direct approach to the study of effects of training on aptitude scores is to compare the scores of trainees tested before training with scores of a comparable group tested after completion of training. An example is a study done by the Alabama State Employment Service in 1964–1965. Candidates for Clerk-Stenographer training under the Manpower Development and Training Act were selected without regard to test scores. They were randomly divided into two groups. Group A was tested with the GATB before training; Group B was tested several months later after completing training. The final groups, after eliminating those in Group A who did not complete the training, consisted of 118 trainees in Group A and 119 trainees in Group B. Groups A and B were compared on average score for each GATB aptitude. None of the obtained differences was statistically significant, indicating that there was no evidence that the training had an effect on aptitude test scores.

Another study on effects of training on aptitude scores was done by the California State Employment Service in 1966 in cooperation with the Montebello and Los Angeles City School Districts. The purpose of the study was to evaluate the effect of training on perceptual and dexterity aptitudes of educable mentally retarded students enrolled in a special, vocationally oriented training program. The experimental sample of 40 students received ten weeks of special training designed to develop perceptual and motor skills. The control group of 44 students did not receive the special training. The results showed that the training had effect on Tool Matching, which measures Form Perception, and Disassemble, which measures Finger Dexterity. However, another finding was that the practice effect from a single previous exposure to a test was greater than the effect resulting from repeated practice on more general exercises designed to improve performance measured by the test. This suggests that the specificity of practice is highly important in improving scores on aptitude tests.

ACADEMIC TRAINING

Similarly, comments have sometimes been made that aptitudes such as those measured by the GATB are acquired or improved by specific academic training. Some studies have been undertaken to determine the influence of training on the aptitude test scores made by college students. The first such study was conducted by Senior (1952) and was designed "to determine the effect of four years of college training on General Aptitude Test Battery (B-1001) scores." The sample consisted of 146 students (76 males and 70 females) tested in the fall of 1948 and retested in the spring of 1952. The author reports that, "In only one instance did students show a greater increase in an area in which it might be assumed they had had special training than did other students not having this training. This greater increase occurred in the case of business majors with the highly significant increase on the N—Numerical Aptitude scale."

Another study by Metzner (1952), somewhat more specific in design, was conducted with the GATB, B—1001, "to determine the influence of training in particular college courses on Verbal and Numerical Aptitudes."

The sample used in this study was divided into two experimental and two control groups. The experimental samples consisted of 30 students enrolled in 2 selected courses in the English department of George Washington University and 66 students enrolled in the College Algebra course in the same university. These groups were considered, respectively, as the experimental "Verbal" and experimental "Numerical" group and each was tested both before and after taking the specific courses mentioned. The control sample for each of the experimental groups consisted of 81 students enrolled in the Elementary Psychology course but not enrolled in the courses used for selecting the experimental groups. All students were given the GATB tests during the first week of the spring semester in 1950 and again during the final week of the semester, which was approximately 3½ months after the initial testing. The results of this study indicated that training in College Algebra significantly affected the performance of the students on the numerical computation test, but the results with the numerical reasoning test were inconclusive. With reference to the influence of courses in the English department on Verbal Aptitude test performance, the author states that "one cannot conclude that training affected the experimental group's performance."

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17. Effect of Sex, Minority Group Status and Cultural Exposure on Aptitude Scores

SEX

Mean Score Comparisons

Results of several GATB studies conducted with samples of high school students were analyzed to determine if there were sex differences in the level of GATB aptitude scores between comparable samples of boys and girls. The analysis was based on 29 pairs of samples of boys and girls.

Of these 29 pairs of samples, 20 pairs were those used in the development of tentative 9th and 10th grade GATB norms (see Chapter 20 of this Section)—7 pairs of 9th grade samples, 5 pairs of 10th grade samples, and 8 pairs of 12th grade samples. One pair of 12th grade samples was from a study reported by the State Testing Staff, Ohio State Employment Service (1949). Six pairs of 12th grade samples were those from individual States (Indiana, Michigan, Minnesota, North Carolina, Pennsylvania, and Wisconsin) in the B-1002, Form A, stability study. (See Chapter 15 of this Section.) Two pairs of 12th grade samples were those from California and Connecticut in the B-1002, Form B, stability study. (See Chapter 15 of this Section.) Descriptions of these individual samples appear in the references cited. The 29 pairs of samples consist of a total of 3,598 boys and 3,852 girls.

Data were available for only 28 pairs of samples on Aptitude K, and for 26 pairs of samples on Aptitudes F and M. Data were available for all 29 pairs of samples on the remaining aptitudes. For each pair of samples the difference was found between the mean scores on each aptitude of the samples of boys and girls. The median of the differences on each aptitude was then obtained to provide evidence of the direction and magnitude of the difference between mean scores of boys and girls on each aptitude.

The largest median differences between boys and girls are on Aptitudes S (Spatial Aptitude), P (Form Perception), Q (Clerical Perception), T (K) (Motor Speed or Motor Coordination), and F (Finger Dexterity). Boys average 7 points higher on Aptitude S, but girls average 6 points higher on Aptitude P, 12 points higher on Aptitude Q, 8 points higher on Aptitude T (K), and 7 points higher on Aptitude F. The direction of sex differences on these aptitudes is quite consistent. Mean scores of boys are higher than mean scores of girls on Aptitude S in 28 out of the 29 pairs of samples, and mean scores of girls are equal to or higher than mean scores of boys on Aptitudes P, Q, T (K), and F in every pair of samples.

The median differences between boys and girls on Aptitudes G (Intelligence), V (Verbal Aptitude), N (Numerical Aptitude), and M (Manual Dexterity) are each three points or less. In addition, there is considerable variation in the direction of the differences between the means of boys and girls among the pairs of samples compared on these aptitudes.

The Australian Department of Labor and National Service (1970) conducted a study on 1064 vocational guidance clients in Canberra, Brisbane, Adelaide and Perth to determine whether the Aptitude S scores of males and females differed significantly. The final sample consisted of all 319 females tested and 319 males matched on the basis of age and ability as measured by a test consisting of number reasoning items, language reasoning items and progressive matrix items. The results of the study show a significant difference between males and females on the GATB spatial items which is quite similar to differences discussed earlier for the United States and also similar to results found with an unweighted sample in Brisbane, Australia in 1968.

Analysis of the data used in the development of 9th and 10th grade norms (see Chapter 20 of this Section) included an analysis to determine whether there were sex differences in average rate of aptitude maturation. Results of this analysis showed that the average increases in aptitude scores between Grade 9 and Grade 12 and between Grade 10 and Grade 12 scores were about the same for boys and girls, indicating that separate sex norms were not needed for the lower high school grades. The analysis of data for the age curve study (see Chapter 18 of this Section) provided evidence on the question of whether there are sex differences in the relationship between average aptitude scores and age for adults in the age range 17–59. Results of an analysis of variance showed that there was a statistically significant (.05 level) interaction between age and sex on only one aptitude, Numerical Aptitude (N). This indicates that, except possibly for Aptitude N, there is no evidence of differences between males and females in the relationship between age and average aptitude test scores.

An assumption underlying Employment Service operations is that job qualifications of individuals should be determined on the basis of ability without regard to spurious factors such as sex, age, race, or religion. The use of separate sex norms for aptitude test batteries would not be consistent with this concept. For example, since men score lower than women on the average on Clerical Perception, better-than-average ability would be represented by a lower score for men than for women. The use of separate sex norms for aptitude test batteries that include Clerical Perception could result in referring less qualified men to job openings for which better qualified women are available. In the counseling situation, use of separate sex norms for a test battery that includes Clerical Perception would result in overestimates of aptitude qualifications of men and underestimates of aptitude qualifications of women for occupations covered by the battery. The question to be answered, therefore is whether employment service aptitude norms are predictive of future job performance for both men and women.

Subgroup Analysis of the Norms

In order to determine whether Employment Service Aptitude Test Batteries are predictive of job performance for both men and women, the data shown in Table 9–1 were inspected and all studies which included at least 30 men and 30 women were identified. The aptitude norms resulting from these studies were then applied separately to men and women and the phi coefficients and P/2 values computed for each subsampling based on sex. The results of this analysis are shown in Tables 17–1 through 17–11.

For three of the jobs shown in these tables, the data are predictive for one sex group and not for the other. As shown on Tables 17–2 and 17–10, the norms for Laboratory Tester and Typsetter-Perforator Operator are predictive for women but not for men. On the other hand, Table 17–8 shows that the norms for Food-Service Worker II are predictive for

Table 17–1. Relationship Between Test Norms (G–105, V–110, N–95, Q–95) and Dichotomized Criterion—Survey Worker 249.268

	N	ϕ	P/2
MALES	72	.30	.01
FEMALES	58	.29	.025
TOTAL	130	.33	.005

Table 17–2. Relationship Between Test Norms (G–110, V–110, N–105, S–100) and Dichotomizer Criterion—Laboratory Tester 029.281

	N	ϕ	P/2
MALES	39	.08	.25
FEMALES	79	.24	.025
TOTAL	118	.20	.025

Table 17–3. Relationship Between Test Norms (G–95, N–95, S–85, Q–100) and Dichotomized Criterion—Tabulating-Machine Operator 213.782

	N	φ	P/2
MALES	107	.18	.05
FEMALES	96	.26	.005
TOTAL	203	.24	.0005

Table 17–4. Relationship Between Test Norms (G–100, N–95, Q–100) and Dichotomized Criterion—Grocery Checker 299.468

	N	φ	P/2
MALES	123	.42	.0005
FEMALES	114	.28	.005
TOTAL	237	.34	.0005

Table 17–5. Relationship Between Test Norms (P–85, Q–85, K–95) and Dichotomized Criterion—Injection-Molding Machine Tender 556.885

	N	φ	P/2
MALES	36	.71	.0005
FEMALES	38	.52	.005
TOTAL	74	.66	.0005

Table 17–6. Relationship Between Test Norms (V–70, M–70) and Dichotomized Criterion—Charwoman, Hospital Maid, and Porter

	N	φ	P/2
MALES	52	.24	.01
FEMALES	31	.44	.01
TOTAL	83	.40	.005

Table 17–7. Relationship Between Test Norms (K–80, M–80) and Dichotomized Criterion—Various Laundry Jobs

	N	φ	P/2
MALES	34	.35	.025
FEMALES	41	.35	.025
TOTAL	75	.37	.005
CROSS VALIDATION (ALL FEMALES)	74	.31	.005

Table 17–8. Relationship Between Test Norms (Q–70, F–70, M–85) and Dichotomized Criterion—Food-Service Worker II 319.138

	N	φ	P/2
MALES	49	.26	.05
FEMALES	51	.05	.25
TOTAL	100	.17	.05

Table 17–9. Relationship Between Test Norms (G–85, V–75, Q–80) and Dichotomized Criterion—Psychiatric Aid 355.878

	N	φ	P/2
Validation Sample			
Males	33	.38	.025
Females	85	.16	.10
Total	118	.31	.0005
Cross Validation [a]			
Males	55	.23	.05
Females	110	.23	.01
Total	165	.24	.005
Combined Sample [b]			
Males	88	.32	.005
Females	195	.24	.005
Total [c]	283	.29	.0005

[a] Includes two cross validation samples.
[b] Includes validation sample and two cross validation samples.
[c] Figures in this row differ from those shown in Table 9-1 because sex of 90 individuals in final sample was not recorded.

Table 17–10. Relationship Between Test Norms (G–105, Q–100, K–90) and Dichotomized Criterion — Typesetter-Perforator Operator 208.588

	N	ϕ	P/2
MALES	69	.12	.25
FEMALES	73	.21	.05
TOTAL[a]	142	.19	.025

[a] Figures in this row differ from those shown in Table 9-1 because sex of 41 individuals in final sample was not recorded.

Table 17–11. Relationship Between Test Norms (G–110, N–100, Q–110, K–100) and Dichotomized Criterion—Librarian 168.026

	N	ϕ	P/2
MALES	82	.45	.0005
FEMALES	284	.21	.0005
TOTAL	366	.27	.0005

men but not for women. However, the norms for the occupations shown in the eight remaining tables (Survey Worker, Tabulating Machine Operator, Grocery Checker, Injection Molding Machine Tender, Charwoman, Hospital Maid and Porter, various laundry jobs, Psychiatric Aid and Librarian) are predictive of future job performance of both men and women in the samples. Although prediction is better for one group than for the other in some of these studies, there is no pattern which would indicate that norms tend to predict better for one group than the other. Overall, the norms tend to predict job performance of men and women equally well.

MINORITY GROUP STATUS

Mean Score Comparisons

Until April 1967 State employment agencies were prohibited from recording the minority group status of applicants, workers or students included in test development studies. Since that time, however, a number of studies have been conducted in which the mean aptitude scores obtained by groups of minority individuals and groups of nonminority individuals were compared. Most of these studies were conducted on available applicant test scores. For instance, the Wisconsin State Employment Service compared the mean aptitude scores of a sample of "white" applicants tested in Beloit, Milwaukee and Racine between January and June 1968 and a sample of "nonwhites" tested at the same locations during the same period of time. The sample sizes range from 358 to 488 for "whites" and from 161 to 207 for "nonwhites", due to the fact that not all individuals were tested on all aptitudes. The results showed mean score differences in the combined sample in favor of "whites" ranging from 2 points (Aptitude F) to 21 points (Aptitude G). In a similar study in 1968 the California State Employment Service compared the test performance of 1,413 Negroes, 1,425 Mexican Americans, 136 Orientals, 171 Indians and 6,672 nonminority group members randomly picked from test papers from local offices throughout the State. The results of this study are shown in Table 17–12. As seen in Table 17–12, the average aptitude scores of Oriental and nonminority applicants are both close to the average for the general working population (100) on all aptitudes. The mean aptitudes G, V, and N scores for Mexican Americans and Indians are lower than the general working population but means on the other aptitudes are comparable to the general working population. The mean Aptitude K and M scores for Negroes are comparable to the general working population sample but mean scores on the other aptitudes are lower than those of the general working population.

Data were available from test development studies on two occupations which permit the comparison of criterion performance as well as test performance of workers in the occupational samples. In one of these studies conducted in 1969, the Wisconsin agency tested 116 males employed as Production Line Welders. The sample contained 56 Negroes, one American Indian and 59 nonminority group

Table 17–12. Mean Aptitude Scores of Various Minority Group Members Tested in California Local Offices, 1968

	G	V	N	S	P	Q	K	F	M
Negro (N = 1,413)	84.3	85.8	83.3	90.8	91.3	93.9	98.4	89.2	99.8
Mexican American (N = 1,425)	90.7	90.0	87.6	99.7	98.0	97.3	102.7	97.7	107.1
Oriental (N = 136)	98.1	95.2	98.1	102.8	100.7	105.0	110.0	97.6	107.6
American Indian (N = 171)	83.7	81.8	82.1	102.5	101.4	97.8	104.7	94.5	112.6
Nonminority (N = 6,672)	101.8	100.9	97.0	105.6	101.9	102.1	100.2	95.6	102.8

workers doing comparable work. The criterion consisted of supervisory ratings on job performance. The mean aptitude and criterion scores of the minority and nonminority samples are shown in Table 17–13. All differences shown in Table 17–13 are significant at the .01 or .05 level of confidence.

Minority group information is available on the validation and two of the check studies used to support the S–266R norms for Draftsman. The validation sample consisted of 232 Draftsmen (Draftsman, Civil; Draftsman, Structural; Draftsman, Geological; and Detailer) employed by commercial firms in California. The first check study consisted of 60 Civil Draftsmen employed by government agencies in California. The second check study consisted of 130 Mechanical Draftsmen completing an MDTA training program in Minnesota. The criterion used in the two California Studies was supervisory ratings. Instructors' ratings and work sample drawings were used as criteria in the Minnesota study. Table 17–14 shows the mean aptitude and criterion scores for the 55 minority group workers in the validation sample (5 Negroes, 29 Spanish Americans and 21 Orientals) and the 177 nonminority group workers in the validation sample. Table 17–15 shows the mean aptitude scores for the 38 Spanish Americans, the 35 Orientals, the 89 minority group individuals (Negroes and American Indians as well as Spanish Americans and Orientals) and the 333 nonminority group members in the total sample available for these three studies. (Mean criterion scores are not shown because of the different criteria used.) The mean aptitude scores of the 55 minority group workers in the S–266R validation sample, (Table 17–14) are either very close to those of the nonminority group workers (on aptitudes, G, V, N, S, and Q) or *higher* than those of the nonminority group workers (on aptitudes P, K, F, and M). Similar results are obtained when the data from two check studies are also considered (Table 17–15).

Table 17–13. Mean Aptitude and Criterion Scores of Minority and Nonminority Production Line Welders

	G	V	N	S	P	Q	K	F	M	Criterion
Nonminority [a]	97.3	94.5	93.6	104.3	103.0	107.5	93.5	88.2	92.3	64.5
Minority [b]	71.3	76.9	69.2	79.1	76.0	87.7	81.0	77.4	84.7	56.6
Difference	26.0	17.6	24.4	25.2	27.0	19.8	12.5	10.8	7.6	7.9

[a] N = 59.

[b] N = 56 Negroes and one American Indian.

Table 17–14. Mean Aptitude and Criterion Scores of Minority and Nonminority Draftsmen in S–266R Validation Sample

	G	V	N	S	P	Q	K	F	M	Criterion
Nonminority [a]	116.0	107.7	110.2	120.1	114.4	117.9	104.7	89.3	97.9	67.4
Minority [b]	114.1	104.9	110.6	120.0	122.0	119.1	115.8	98.6	108.5	66.5

[a] N=177.

[b] N=5 Negroes, 29 Spanish Americans and 21 Orientals.

Table 17–15. Mean Aptitude Scores of Minority and Nonminority Draftsmen in S–266R Validation and Check Study Samples

	G	V	N	S	P	Q	K	F	M
Spanish American (N=38)	114.0	105.5	109.2	120.5	122.0	114.7	110.8	98.8	109.1
Oriental (N=35)	117.3	107.0	117.9	121.4	129.2	123.9	121.3	101.1	112.3
Total Minority (N=89) [a]	114.6	105.3	112.0	121.7	122.9	118.3	112.6	99.1	108.3
Nonminority (N=333)	115.9	107.1	110.9	121.4	115.9	115.6	104.5	94.9	101.4

[a] Includes 9 Negroes and 7 American Indians as well as individuals shown in first two rows of table.

The conclusions from the limited data available seem to be that mean score differences do exist on some aptitudes for some minority groups when applicant samples are used, but such differences may or may not exist within specific occupational samples and the differences, where they exist, might be either in favor of minorities or nonminorities. Efforts are being made to obtain data for additional occupational samples so that this area can receive the additional study that it deserves.

Subgroup Analysis of the Norms

The studies reported in the previous section show that some mean score differences between minority group individuals and nonminority group individuals have occurred in a number of settings. As discussed earlier in the section on aptitude score differences related to sex of examinee, the qualifications of individuals should be determined on the basis of ability as measured by the best available assessment instruments without regard to spurious factors such as sex, age, race or religion so that overestimates or underestimates of aptitude qualifications are not made. Therefore, the initial question is not how the aptitude performance of various groups might differ, but what does a particular aptitude score mean in terms of future job performance for the various groups involved.

Data reported above on the Production Line Welder and Draftsman studies permit this sort of comparison to be made. Table 17–16 shows this information for the minority and nonminority samples of Production Line Workers. Although the phi coefficient for the nonminority subsample is slightly higher than that for the minority subsample, aptitude scores are very predictive of job performance for both groups. (The significance level of the phi coefficient is .0005 for both samples.)

Table 17–17 shows information for the minority and nonminority samples of Draftsmen included in the S-266R validation study. Table 17-18 shows information for the Spanish Americans, Orientals, Total Minority and Total Nonminority individuals included in the S-266R validation and check studies.

In the validation sample, the S-266R norms provide satisfactory prediction for minority and nonminority group workers (Table 17-17). When the two cross validation studies in which minority group status is known are considered (Table 17-18) satisfactory prediction is also obtained for the total minority group sample. In Table 17-18, the phi coefficients for the small samples of Spanish American and Oriental workers are also shown. The coefficients for Spanish Americans is significant but the coefficient for Orientals is not significant.

Table 17-16. Relationship Between Test Norms (P-70, M-75) and Dichotomized Criterion—Welder, Production Line 812.884

	N	ϕ	P/2
Minority	57 [a]	.47	.0005
Nonminority	59	.61	.0005
Total	116	.58	.0005

[a] 56 Negroes and one American Indian.

Table 17-17. Relationship Between Test Norms (N-90, S-115, P-90, Q-100) and Dichotomized Criterion — Draftsmen Validation Study

	N	ϕ	P/2
Minority	55 [a]	.31	.025
Nonminority	177	.39	.0005
Total	232	.38	.0005

[a] 5 Negroes, 29 Spanish Americans and 21 Orientals.

Table 17-18. Relationship Between Test Norms (N-90, S-115, P-90, Q-100) and Dichotomized Criterion—Draftsmen Validation and Cross Validation Studies Combined

	N	ϕ	P/2
Spanish American	38	.39	.01
Oriental	35	.20	.15
Total Minority	89 [a]	.32	.0005
Nonminority	333	.34	.0005
Grand Total	422	.34	.0005

[a] Includes 9 Negroes and 7 American Indians as well as individuals shown in first two rows of table.

No conclusions can be made about the predictive value of aptitude norms when used with minority group members from the limited data available. Efforts currently under way to obtain such data for additional occupational samples should allow some broad generalizations such as was possible from the sex data on eleven occupations reported earlier. Until such data are available, the assumption must be that aptitude norms are predictive of job success of minority group members.

CULTURAL EXPOSURE

Whenever differences in mean aptitude scores of minority group individuals as compared with nonminority group individuals are obtained, the possibility is raised that some or all of the difference can be explained by differences in the prior experiences of the groups. That is, not all minority group members have had the cultural exposure assumed for the majority group. On the other hand, many nonminority group individuals also may be lacking in this culture exposure. Cultural exposure, therefore, becomes another dimension in studying differential aptitude performance of various groups. In fact the Equal Employment Opportunity Commission's *Guidelines on Employment Testing Procedures* (1966) includes a report by a panel of psychologists recommending that the Commission " . . . encourage that as rapidly as possible, validation studies be conducted with minority groups using measures of cultural background as moderator variables."

In order to get an objective measure of cultural background suitable for research use, a "Research Questionnaire-Background" was developed (Droege and Hawk, 1969). The items included in the empirical key cover mother's education, father's education, public assistance received, father's occupation, parental presence in the home and the individual's evaluation of the financial status of the family. The instrument was found to provide good differentiation between advantaged and disadvantaged high school seniors in an urban area.

The Research Questionnaire-Background was used in the study on Production Line Welder discussed earlier. Based upon an interim key used before the developmental research on the instrument was completed, mean score differences of between 6 points (Aptitude N) and 13 points (Aptitude F) in favor of the "culturally exposed" were found. The S–447 norms for Production Line Welder produced a phi coefficient of .49 ($P/2 < .0005$) with the 22 individuals considered to be "culturally exposed" and a phi coefficient of .68 ($P/2 < .0005$) with the 44 individuals considered to be "culturally deprived." (100% of the "culturally deprived" meeting the aptitude test norms were good workers).

Because of the restricted range of scores when the instrument was scored according to the empirical key, it appeared to be preferable to tricotomize the sample based upon cultural exposure rather than to dichotomize it. Therefore, high, medium and low groups of 50, 33 and 33 respectively were identified and the mean aptitude and criterion scores of each of these groups computed. The results are shown in Table 17–19. The results are hard to interpret as the "medium" group tends to have the lowest mean scores on the nonmanipulative aptitudes. The validity of the S–447 norms when applied to the data for each of these three groups is shown in Table 17–20. Note that good prediction of job performance is obtained with all three groups but the best prediction is obtained with the "low cultural exposure" group.

The mean cultural exposure score (empirical key) obtained by minority group members in the Production Line Welder study was 2.1 while the mean obtained by the nonminority group workers was 2.5. Droege and Hawk (1969) recommend that experimental aptitude score adjustments for aptitudes G, V, N, S, P and Q based upon Research Questionnaire-Background scores be made in test development studies to eliminate the effect of cultural exposure on aptitude scores and to determine the extent to which cultural exposure is a factor in test validity. Those adjustments were made in the data for Production Line Welder and the data were then reanalyzed. Essentially no changes in aptitude-criterion correlations were obtained, after adjustment of the aptitude scores of the 116 Production Line Welders. Almost the same multiple-hurdle norms and phi coefficient were obtained with these adjusted scores as in the original analysis. (Adjusted scores resulted in raising aptitude P cutting score 5 points and phi coefficient 3 points.)

No generalization about the usefulness of Research Questionnaire-Background data in test development studies or the effects of cultural exposure on GATB aptitude scores can be made until data for many more occupations have been collected. Such data are currently being collected.

Table 17–19. Mean Aptitude and Criterion Scores of Production Line Welders at Three Levels of Cultural Exposure

	G	V	N	S	P	Q	K	F	M	CR3
High (N=50) [a]	86.4	86.7	81.5	96.3	90.5	98.1	86.9	88.4	89.4	61.2
Medium (N=33) [b]	77.6	81.2	76.4	82.1	85.0	94.8	87.8	79.4	88.2	59.6
Low (N=33) [c]	88.7	89.3	86.9	95.2	93.4	100.3	87.7	78.0	87.8	60.6

[a] Score of 3, 4, or 5 on Research Questionnaire-Background.

[b] Score of 2 on Research Questionnaire-Background.

[c] Score of 0 or 1 on Research Questionnaire-Background.

Table 17–20. Relationship Between Test Norms (P–70, M–75) and Dichotomized Criterion—Welder, Production Line 817.884

	N	ϕ	P/2
High Cultural Exposure	50	.44	.0005
Medium Cultural Exposure	33	.39	.025
Low Cultural Exposure	33	.78	.0005
Total	116	.58	.0005

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18. Effect of Aging on Aptitude Scores

The average age of the nation's labor force continues to increase, and growing numbers of older workers are being involuntarily retired or technologically displaced and compelled to look for other jobs late in their working lives. Many of those who need help in finding suitable new employment cannot be placed in jobs which are closely related to the ones which they had held previously. To what extent can aptitude testing help determine what other jobs these older applicants can learn and perform successfully?

Since most of the research on development of aptitude norms for personnel selection and counseling has been carried out with samples of younger workers, a question arises as to the applicability of these norms for older workers. A full investigation of this question requires study of (1) the relationship between aptitude scores and age, (2) the relationship between job performance and age, and (3) the interrelationships among aptitude scores, job performance, and age. A summary of previous research findings in these areas and a discussion of research problems follows.

PREVIOUS RESEARCH FINDINGS

Relationship Between Aptitudes and Age

Both longitudinal and cross-sectional experimental designs have been used in studies on the relationship between aptitude tests and age. In the longitudinal design, a sample of individuals in a particular age group is tested initially and then retested with the same form or an alternate form of the test after an intervening period of time. In such studies, a comparison is made between initial test scores and retest scores of the same individuals. The major problem in longitudinal studies is in controlling the effects of practice on the test scores. In cross-sectional studies, a wide range of age is represented in the sample, and the individuals in the sample are tested only once. In such studies, a comparison is made between average test scores of individuals in various age intervals. The major problem in cross-sectional studies is in obtaining comparable groups of individuals in the various age intervals. Because of the time required to complete a longitudinal study to obtain evidence of change in the abilities of individuals, most research on the relationship between aptitudes and age has been conducted using the cross-sectional design. Most studies on the relationship between aptitudes and age have been done with tests of "intelligence." Because of the considerable variation in the results of the studies, it is not possible to generalize as to the relationship between intelligence and age for adults. Apparently the results obtained in a given study are influenced by (1) the type of experimental design used in the study, (2) the level of ability of individuals in the sample, and (3) the types of tests used to measure intelligence.

Results of cross-sectional studies (Jones, 1955; Jones & Conrad, 1933; Miles & Miles, 1932; Wechsler, 1958) generally show a decline in intelligence test scores with age beginning as early as the twenties or thirties. Results of longitudinal studies (Bayley, 1955; Bayley & Oden, 1955; Owens, 1953) suggest that there is an increase in intelligence test scores with age until at least age 50.

It is possible that the level of ability of individuals in the sample affects the curve of relationship between intelligence and age. There is some evidence that superior individuals maintain their intellectual abilities throughout adult life to a greater extent than do individuals of average or below-average intelligence.

There is evidence that the relationship between intelligence test scores and age also depends, in part, on the nature of the test used to measure intelligence. For example, Doppelt and Wallace (1955) and Wechsler (1958) have found that certain of the subtests of the Wechsler Adult Intelligence Scale (WAIS) "hold" with age, while others do not "hold." Whiteman and Jastak (1957) found similar differences in the relationship to age of subtests of the Wechsler–Bellevue. Brown (1938) and Lorge (1936) concluded that younger individuals tended to do better than older individuals on speeded tests of intelligence, but no better on power tests.

Although most of the studies on the relationship between age and aptitudes have been based on tests of intelligence, some work has been done with measures of perception and dexterity. Results of studies on perceptual abilities (Welford, 1958) and motor abilities (Miles, 1931) indicate that there is some decline in these abilities with age for adult groups. The decline in test performance appears to be greater on tests of perceptual and motor functions than on tests of intelligence.

Relationship Between Job Performance and Age

The cross-sectional experimental design has been used extensively in studies on the relationship between job performance and age. In cross-sectional studies, a wide range of age is represented in the sample, and measures of job performance are obtained for each individual in the sample. A comparison is made between the average job performance of individuals in various age intervals.

Few well controlled cross-sectional studies have been conducted in this area because of the difficulty of obtaining suitable samples with a wide age range and measures of performance that are comparable for individuals in the various age intervals. Even when an occupational sample with a wide age range can be obtained, it is not always reasonable to assume that groups of workers in the various age levels are comparable. For example, Belbin (1953) concluded from an analysis of turnover that older workers tended to leave an occupation after they could no longer maintain acceptable levels of production by added effort. Results of studies by Clay (1956) and King (1956) also point to this conclusion. In cross-sectional studies it is often difficult to obtain comparable measures of job performance for individuals in the various age intervals. For example, the older, more experienced workers may tend to occupy the most favorable work positions so that their production cannot be compared directly to the production of younger workers. Similarly, supervisory ratings may be biased in favor of the older workers. In addition to the other difficulties associated with the cross-sectional design, there is a fundamental question of the appropriateness of any criterion measure based on job performance after the training period has been completed. Job skills of experienced workers are constantly being reinforced with experience so that, for some occupations, job performance of experienced workers may not change to any extent with age. However, ability to *learn* the job may change considerably with age, and learning ability may be the factor of greatest importance to a prospective employer.

The longitudinal design would be the appropriate one to study changes with age in the ability to learn new jobs. This design requires samples of inexperienced older and younger workers who are hired and compared with regard to criteria such as performance in training and time required to reach standard production on the job.

Because of the considerable variation in the results of the cross-sectional studies which have been conducted, it is not possible to generalize as to the relationship between job performance and age. Apparently the results obtained in a given study are influenced by (1) the nature of the occupation being studied, and (2) the nature of the sample.

Decline of performance with age appears to be greatest in occupations requiring motor abilities and in occupations which are so routine that experience cannot compensate for decline in ability. Mark (1956) found that decline in performance on a piecework assembly operation first became substantial in the age interval 55–64, and King (1956) found that performance among a sample of sewing machine operators began to decline after age 35. However, Kutscher and Walker (1960) and Maher (1955) found no decline in performance with age among clerical workers and salesmen, respectively, jobs in which experience may have an important effect on performance.

The relationship between performance and age may depend on the adequacy of the sample. For example, Clay (1956) found little decline in production in skilled printing occupations until about age 50, but concluded that the decline after age 50 might have been greater if the older workers who had transferred out of the occupations had been included in the sample.

Interrelationships Among Age, Aptitude Performance, and Job Performance

As indicated before, results of studies on the relationship between age and performance (aptitude scores or job success measures) provide some evidence that the type of age-performance relationship that exists depends on the type of performance measured. To determine whether the same aptitude norms are appropriate for predicting job performance of both younger and older workers in a particular occupation, it is necessary to study the interrelationships among age, aptitude performance, and job performance. Problems of obtaining adequate criterion data throughout the age range for conducting research in this area are very complex. Ideally, the longitudinal design should be used to obtain measures of success in training as well as later success after the training has been completed, but it is usually not feasible to obtain suitable data for a longitudinal study.

Odell (1956) reported a cross-sectional study on the interrelationship of age, GATB aptitude scores, and rated performance on an assembly job. A double cross-validation design was used in which aptitude norms, developed separately on samples of older (age 45 and older) and younger (age 44 and younger) experienced workers, were applied to the younger and older samples, respectively. The best norms for older workers included different aptitudes and cutting score levels than the best norms for younger workers. Neither set of norms showed good selectivity or satisfactory prediction when applied to the other sample.

Hirt (1964) did a study on applicability of the GATB for determining the aptitudes of older individuals and their relationship to job performance. The results were inconclusive, and it was recommended that the possible need of a correction factor for age be researched.

A study was conducted by Stein (1962) in which a correction factor for age decrement in Manual Dexterity (M) scores was applied. He found that the correction resulted in a substantial change in the size of the relationship between Aptitude M and a criterion of job performance for a sample of employed patternmakers. However, interpretation of the results as they apply to the selection problem is difficult because the sample consisted of a group of workers with a range of experience rather than a uniformly inexperienced applicant group studied on a longitudinal basis.

Related to the question of relationship of age decrements in aptitude scores to validity of prediction is the question of the extent to which the underlying factors measured by aptitude tests are a function of age. For if the tests do not measure the same factors throughout the age range, the validity of prediction cannot be generalized from one age group to another. Weiner (1964) did a factor analysis study on the organization of GATB aptitudes which showed that the factors identified had stability throughout the age range 14 to 54. This is an important study because it provides evidence which supports the common practice of using the same tests over a wide age range and interpreting the results in the same way for different age groups.

AGE CURVES FOR APTITUDES OF THE GATB

In response to the need for information on the effects of aging on the aptitudes of the GATB, the New York State Employment Service conducted a study to investigate the relationship between age and GATB aptitude scores for adults. An additional study was subsequently undertaken in which four other State agencies participated. Since the New York Experimental design differed from the design for the four-state study with respect to educational controls, proportions of males and females in each age interval, and form of the GATB used, each design will be described separately.

Experimental Design

New York study. The sample consists of 730 males and 746 females who were tested in New York State during the period 1954 to 1957. This sample was selected from a group of more than 8,000 individuals for whom data were available. The sample was selected in such a way that the percentage distribution of years of education would be identical for the male and female subsamples in each of the 11 age intervals in the study. Results of an analysis of variance showed that the mean educational levels for individuals in the various age intervals were not significantly different. Tables 18–1 and 18–2 show the distribution of cases by age, education and sex. The entire sample was tested with the GATB, B–1002, Form A.

Four-state study. The experimental design for the four-state study was similar to that for the New York study. The chief differences in the designs were in the type of control on education and the form of the GATB used for older persons. In the New York study, the individuals in each age interval had the same percentage distribution of years of education; in the four-state study each individual in the sample had the same number of years of education (12 years). In the New York study all were tested with the B–1002 edition of the GATB; in the four-state study individuals over age 40 were tested with the B–1001 edition be-

Table 18–1. Distribution by Age and Education of All Males in the New York Sample—N=730

Education (Yrs.)	Age Interval												
	Proportion	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65+	Total
5–8	.091	2	1	9	12	12	10	6	4	3	2	4	65
9–11	.321	9	5	33	44	43	35	22	14	9	7	12	233
12	.300	8	5	31	41	40	33	20	13	9	7	12	219
13+	.288	8	5	30	39	39	32	20	13	8	7	12	213
Total	1.000	27	16	103	136	134	110	68	44	29	23	40	730

Table 18–2. Distribution by Age and Education of All Females in the New York Sample—N=746

Education (Yrs.)	Age Interval												
	Proportion	18–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65+	Total
5–8	.091	4	3	4	12	12	9	11	5	3	2	1	66
9–11	.321	14	12	16	44	42	33	37	19	10	8	5	240
12	.300	14	11	15	41	39	31	35	17	10	8	5	226
13+	.288	13	11	14	39	37	29	33	17	9	8	4	214
Total	1.000	45	37	49	136	130	102	116	58	32	26	15	746

cause of the possibility that the separate answer sheet in B–1002 might be difficult for older persons to use. The age intervals in the New York and four-state studies were the same in the age range 18–64; additional intervals at ages 17, 65–69, and 70–74 were included in the four-state study. (All individuals in the New York sample age 65 and older were grouped in one interval; the mean age of these individuals was 68.9 years.)

The California, Iowa, Michigan, and Pennsylvania agencies participated in the four-state study. Most of the subjects in the study were local office applicants and employed workers. The Michigan agency supplemented its sample in the lower age intervals with first semester college freshmen, and in the upper age intervals with persons considered to be employable who were tested through cooperating social organizations and institutions. Each State agency attempted to obtain an equal number of men and women in each age interval, but this was not always possible. All individuals in the study had exactly 12 years of education. All individuals in the sample who were age 39 and younger were tested with the GATB, B–1002, Form A. All individuals who were age 40 and older were tested with the GATB, B–1001. Their scores were converted to B–1002 equivalents to ensure comparability of scores of the older and younger individuals. Table 18–3 shows the distribution of cases by age, State, and sex.

Results

Four-state study. An analysis of variance based on data for the four-state study was performed for each aptitude to test for the significance of effects of age, sex, and the interaction between age and sex on the aptitude scores. The analysis of variance design used was Lindquist's A x B x R design (random replications of a two-factor experiment), (Lindquist, 1953, Ch. 10). Since the number of cases was not the same for all cells in the table, the analysis was based on the unweighted cell means rather than on the individual measures. The analysis was limited to the data for individuals in the age range 17–59 because the upper age intervals did not include adequate numbers of cases. Table 18–4 shows the results of the analysis of variance.

Table 18–3. Distribution of Cases in the Four-State Study by Age, State, and Sex—N=2,439

Age Interval	California		Iowa		Michigan		Pennsylvania		Total
	Male	Female	Male	Female	Male	Female	Male	Female	
17	37	37	25	25	50	50	10	10	244
18–19	37	37	49	25	60	60	10	10	288
20–24	37	37	37	25	95	95	10	10	346
25–29	37	37	25	25	50	50	10	10	244
30–34	37	37	22	23	50	50	10	10	239
35–39	28	28	25	23	40	40	10	10	204
40–44	25	25	25	21	26	26	10	10	168
45–49	34	34	23	27	20	20	20	20	198
50–54	25	25	13	18	13	13	20	20	147
55–59	30	30	13	11	10	10	20	20	144
60–64	15	15	8	3	10	10	20	20	101
65–69	15	15	—	—	10	10	8	8	66
70–74	10	10	—	—	11	11	4	4	50
Total	367	367	265	226	445	445	162	162	2,439

Table 18–4. Results of F Tests in Analysis of Variance Based on Data from Four-State Study

Source of Variation	d.f.	Aptitude								
		G	V	N	S	P	Q	K	F	M
Age	9	3.31**	1.56	2.36*	35.55**	82.22**	14.53**	14.20**	29.52**	17.09**
Sex	1	5.68	.16	1.68	8.94	2.08	46.45**	50.36**	60.32**	.43
Interaction (age × sex)	9	1.55	1.19	2.54*	2.01	.86	2.05	1.27	1.37	1.34

*Significant at the .05 level.

**Significant at the .01 level.

Note.—The triple interaction (age × sex × State) was used as the error term in testing for the age × sex interaction; the age × State interaction was used as the error term in testing for the main effect of age; the sex × State interaction was used as the error term in testing for the main effect of sex.

Results of the F tests indicate significant (.05 or .01 levels) effects of age on aptitude scores for all aptitudes except Verbal Aptitude (V). Only Aptitude V shows no decline in average aptitude scores with age. The effect of sex on aptitude scores is significant (.01 level) for Clerical Perception (Q), Motor Coordination (K), and Finger Dexterity (F). Mean scores on these aptitudes tend to be higher for females than for males throughout the age range. There is a significant (.05 level) interaction between age and sex only for Numerical Aptitude (N). This indicates that, with the possible exception of Aptitude N, there is no evidence that the rate of change of average aptitude scores with age differs for males and females. Thus, for purposes of developing composite age curves, data for males and females may be combined without distorting the shapes of the curves.

Table 18–5 shows the combined means of GATB aptitude scores and number of OAP's passed by age interval. A method of proportional N's (Snedecor, 1956), in which the mean scores of each of the eight male and female groups were weighted in accordance with the N's for all age intervals, was used to obtain combined means for the various age intervals. The OAP analysis was based on the 23 OAP's in the July, 1958 edition of the OAP structure.

New York study. Table 18–6 shows the combined means of GATB aptitude scores by age interval for the New York study. The combined means are simple averages of the means for males and females. As indicated by the results of the analysis of variance in the four-state study, the trend of mean aptitude scores with age does not differ significantly for males and females, with the possible exception of Aptitude N. This indicates that equal or proportional weighting of mean scores of males and females to obtain combined means may be done without distorting the trend of the relationship.

Discussion

Comparison of results of New York and four-state studies. The relationships between mean aptitude scores and age for the New York and four-state studies are shown graphically in Figures 18–1 through 18–9. Inspection of these age curves shows that, in general, the pattern of relationship between mean aptitude scores and age is similar in the two studies. It appears that the somewhat different controls on education in the two studies did not have an appreciable effect on the results. Additional evidence that the type of control on education does not affect the shape of the age curves was obtained from a study of 862 cases selected from Employment Service files of data for test development studies. The selected cases, covering an age range 20–74, all had 6, 7, or 8 years of education as compared with 12 years of education for all individuals in the four-state study. The levels of the curves of rela-

Table 18–5. Combined Mean Aptitude Scores and Number of Occupational Aptitude Patterns Passed for the Four-State Study—Total N=2,439

Age Interval	N	Aptitude									Number of OAP's Passed
		G	V	N	S	P	Q	K	F	M	
17	244	108.8	103.0	107.4	112.5	112.8	108.0	107.5	98.0	105.9	14.8
18–19	288	105.8	100.5	105.2	109.9	111.8	107.5	108.5	103.3	105.2	14.2
20–24	346	107.7	102.8	106.0	111.0	111.7	110.0	109.8	103.8	105.4	14.8
25–29	244	105.7	103.9	103.6	105.5	106.7	106.9	108.6	102.8	106.2	13.7
30–34	239	105.0	104.7	102.9	103.9	103.6	105.7	106.0	103.2	104.0	13.6
35–39	204	107.2	106.9	103.8	105.1	100.5	104.9	103.9	99.0	100.6	13.6
40–44	168	106.0	107.8	105.4	101.2	95.3	100.4	100.7	92.6	95.7	11.2
45–49	198	101.7	105.0	101.1	95.8	89.5	95.8	98.8	88.7	90.5	8.6
50–54	147	104.0	106.3	103.1	97.4	87.0	96.2	95.2	82.8	85.0	8.2
55–59	144	101.0	107.7	99.0	90.4	81.9	92.8	91.9	73.5	76.5	4.6
60–64	101	97.6	102.3	97.7	88.7	75.3	88.4	88.1	70.7	67.1	3.1
65–69	66	97.6	104.2	101.4	84.9	74.0	85.9	84.4	68.7	66.8	3.3
70–74	50	94.9	103.2	93.6	83.2	70.7	82.4	81.3	55.1	57.4	1.4

Table 18–6. Combined Mean Aptitude Scores for the New York Study—Total N=1,476

Age Interval	N	Aptitude								
		G	V	N	S	P	Q	K	F	M
18–19	72	97.3	96.5	96.5	101.1	103.6	105.3	101.0	101.3	105.6
20–24	53	96.4	97.4	95.3	96.6	100.4	103.2	101.1	97.0	101.1
25–29	152	102.8	105.5	101.0	99.9	102.8	106.1	105.4	105.0	110.1
30–34	272	99.0	101.9	99.4	94.1	97.0	103.3	104.9	98.7	106.3
35–39	264	101.2	104.2	101.6	93.5	92.6	104.5	106.1	98.8	107.5
40–44	212	101.3	105.4	102.1	91.4	90.9	103.4	104.1	95.8	107.8
45–49	184	99.9	105.9	98.2	90.2	84.0	98.6	102.5	88.2	96.3
50–54	102	97.1	102.7	95.1	88.6	81.7	97.0	100.7	81.4	89.8
55–59	61	100.8	104.9	100.3	90.4	80.9	100.1	93.9	83.6	86.6
60–64	49	103.1	107.8	100.8	88.8	80.4	99.7	92.2	70.9	74.6
65+	55	89.1	93.3	87.7	84.3	72.2	89,3	82.9	64.3	69.4

Note.—Number of cases for Aptitudes F and M somewhat smaller than for other aptitudes.

tionship between mean aptitude scores and age were from 0 to 15 points lower than corresponding curves for the four-state study. However, the *trends* of the relationship for each aptitude were very nearly parallel in the two studies.

The trends. All aptitudes except Verbal Aptitude (V) show some decline in average scores with age. However, the decline is not large for Intelligence (G) and Numerical Aptitude (N). The largest declines (up to 40 points from age 17 to age 72) were obtained for Form Percep-

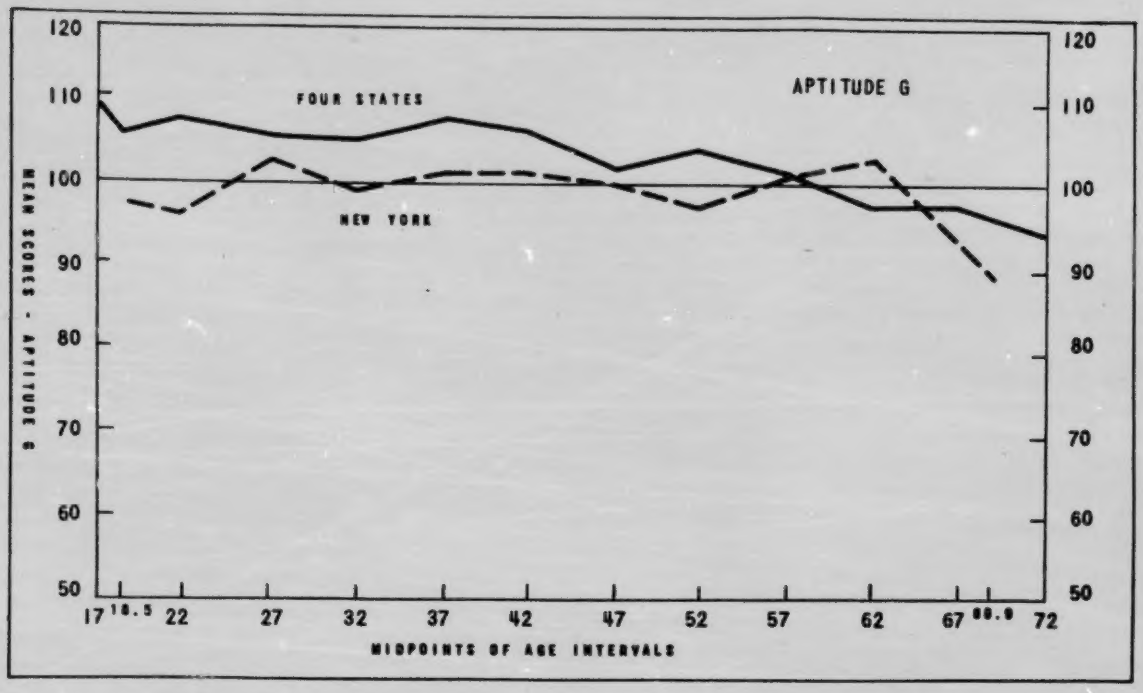

Fig. 18–1. Age curves for Aptitude G (Intelligence) for New York and four-state studies.

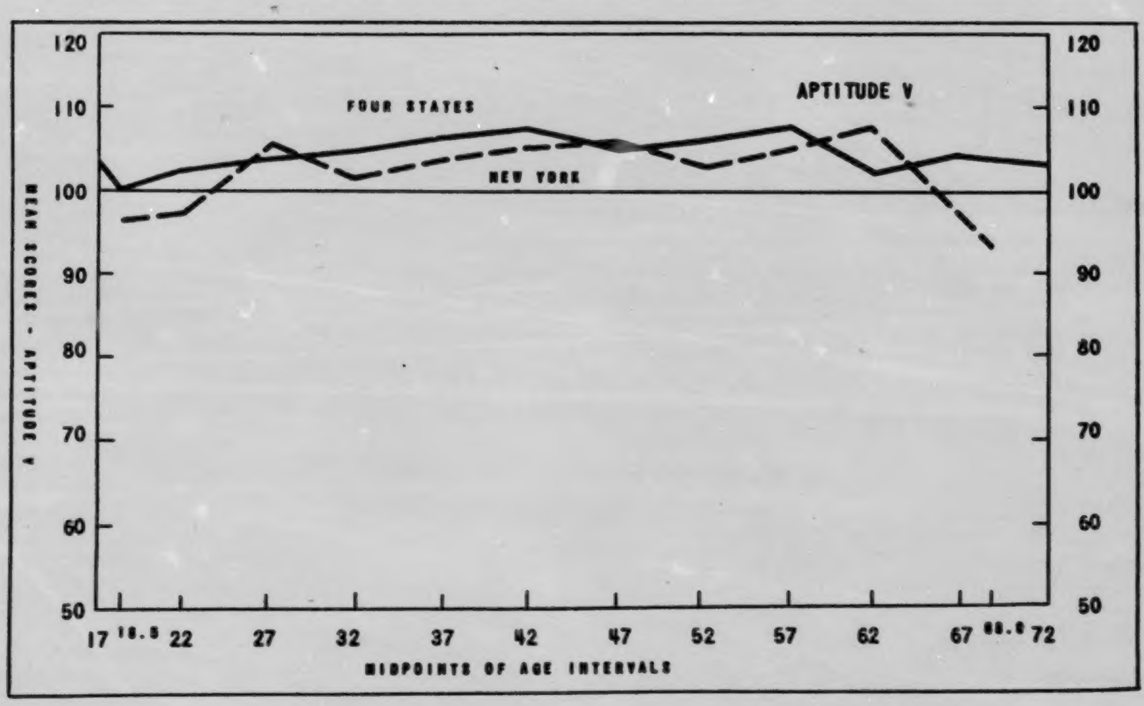

Fig. 18–2. Age curves for Aptitude V (Verbal Aptitude) for New York and four-state studies.

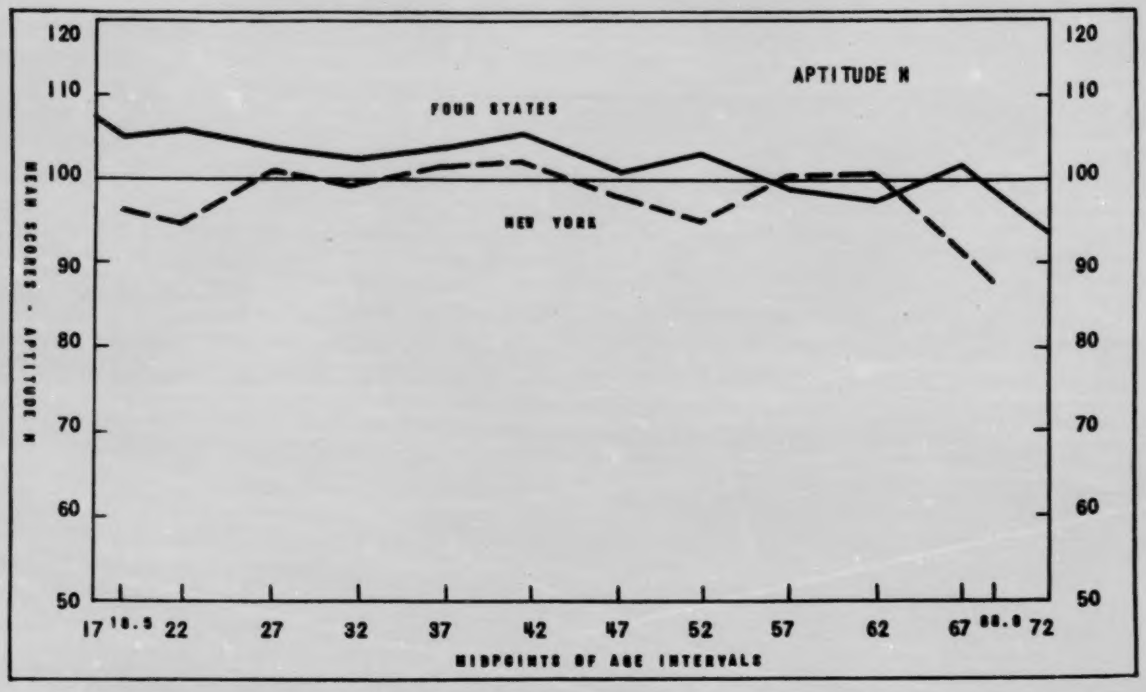

Fig. 18–3. Age curves for Aptitude N (Numerical Aptitude) for New York and four-state studies.

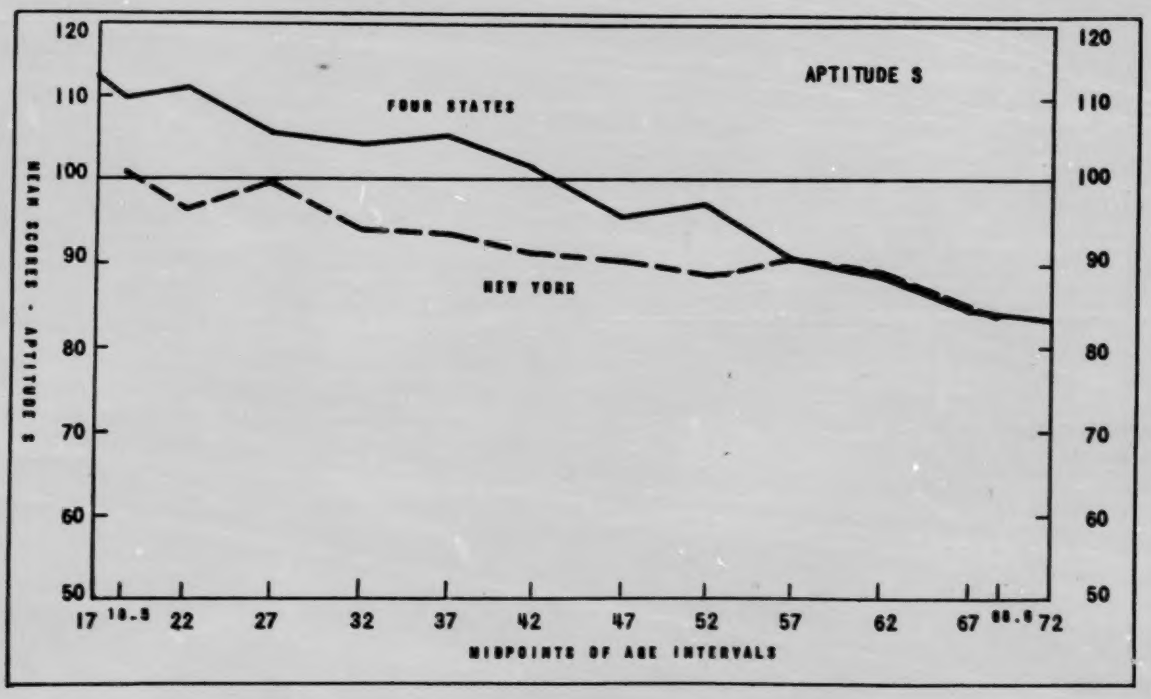

Fig. 18–4. Age curves for Aptitude S (Spatial Aptitude) for New York and four-state studies.

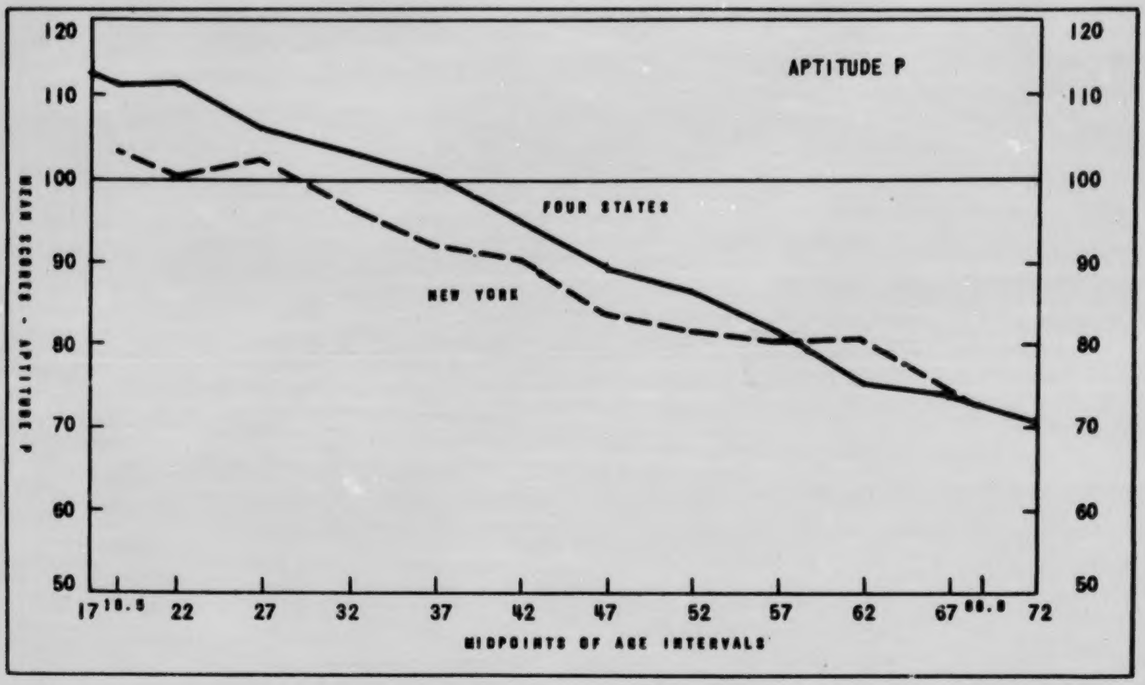

Fig. 18–5. Age curves for Aptitude P (Form Perception) for New York and four-state studies.

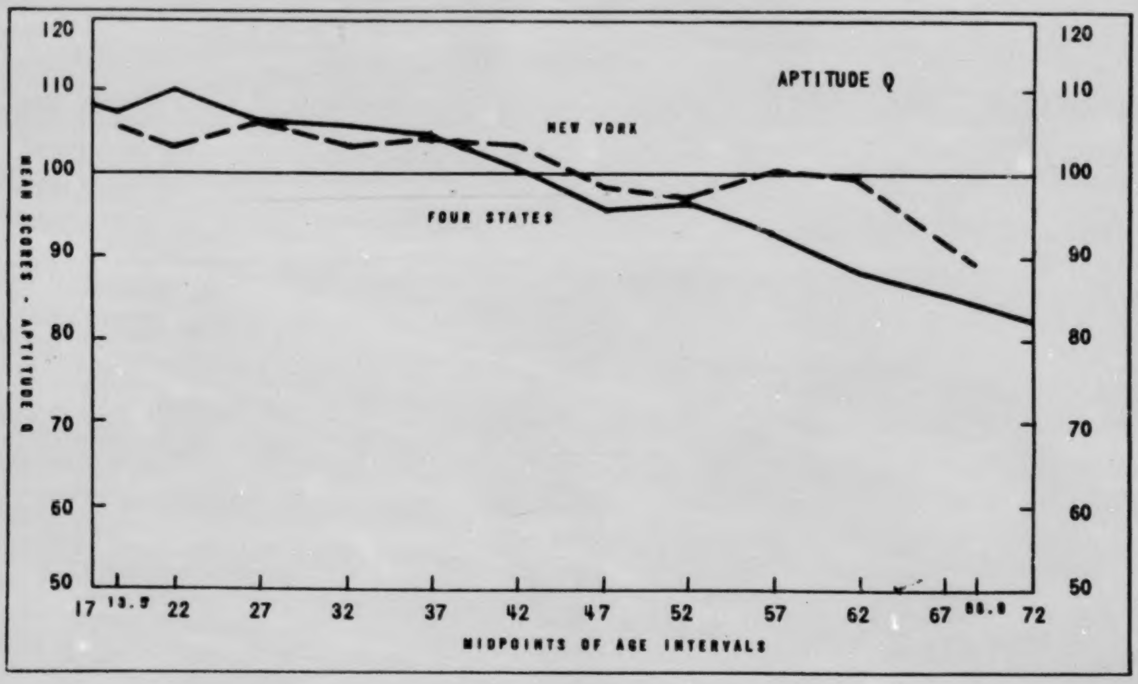

Fig. 18–6. Age curves for Aptitude Q (Clerical Perception) for New York and four-state studies.

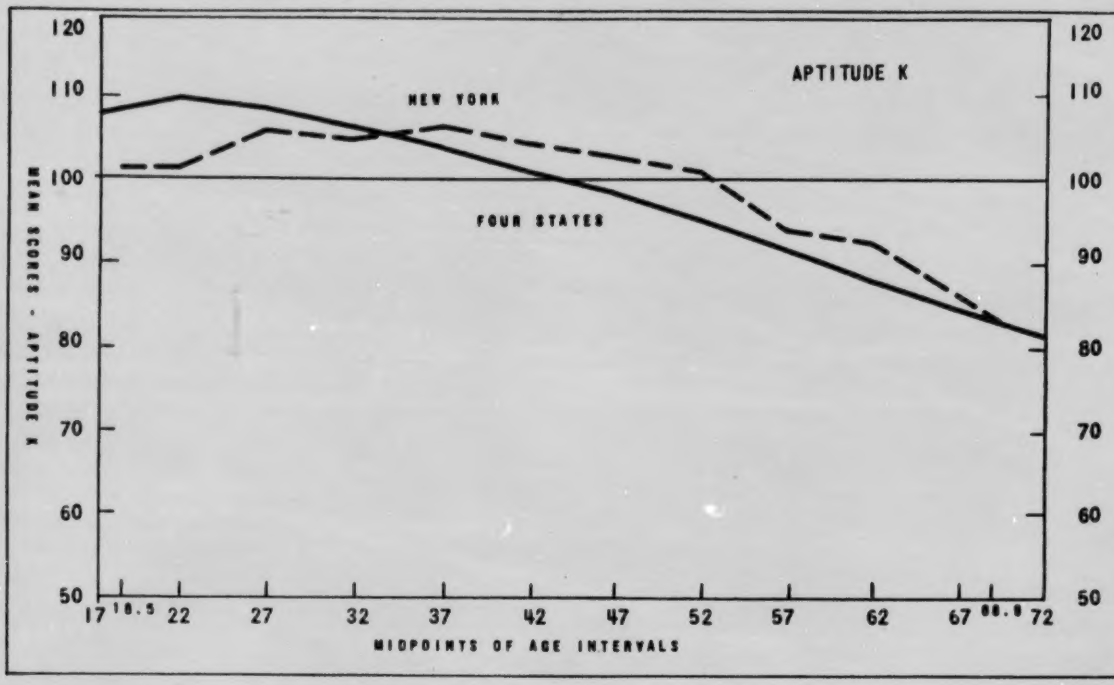

Fig. 18–7. Age curves for Aptitude K (Motor Coordination) for New York and four-state studies.

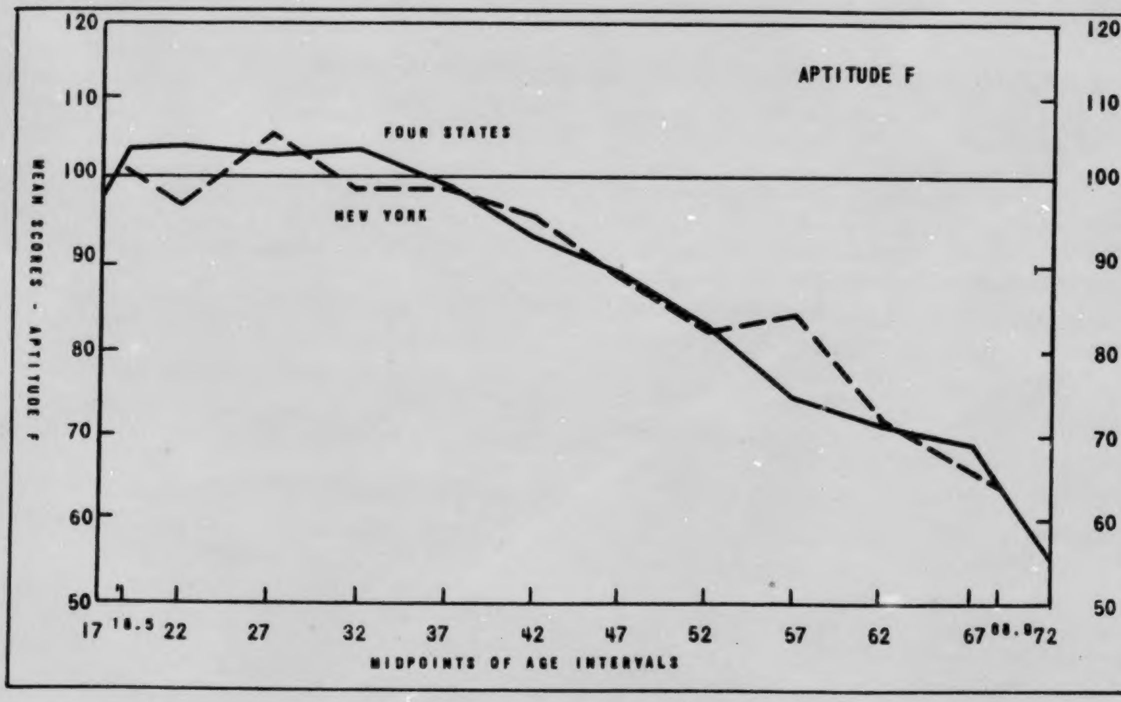

Fig. 18–8. Age curves for Aptitude F (Finger Dexterity) for New York and four-state studies.

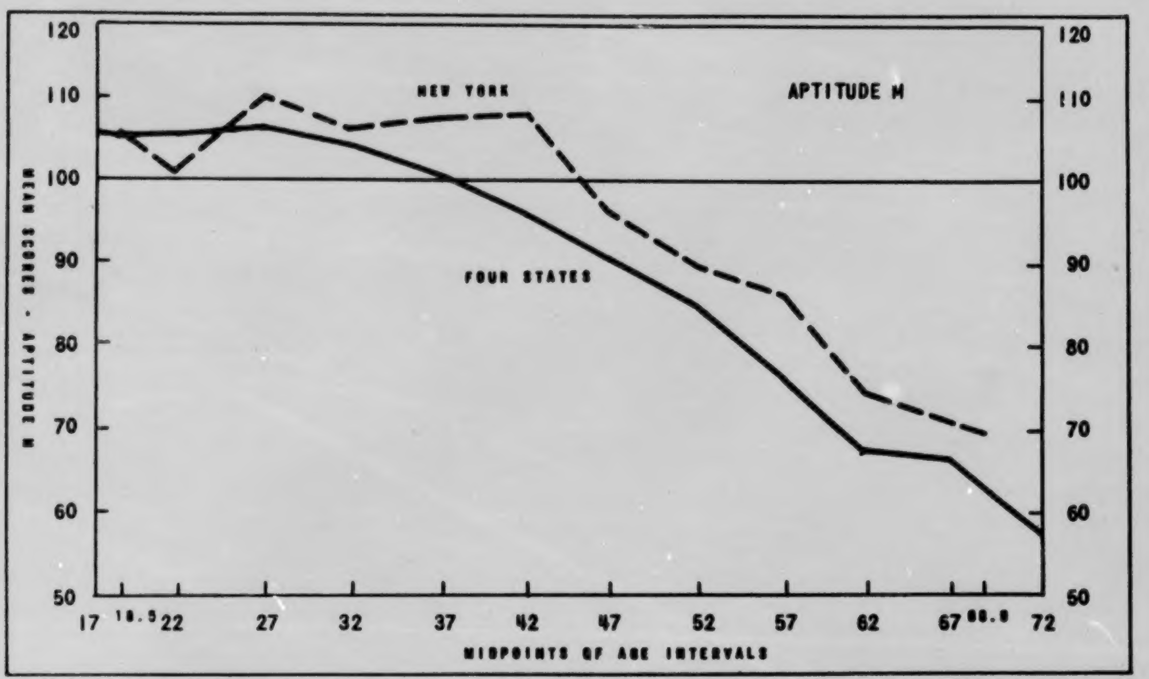

Fig. 18–9. Age curves for Aptitude M (Manual Dexterity) for New York and four-state studies.

tion (P), Finger Dexterity (F), and Manual Dexterity (M). Declines of about 20 points from age 17 to age 72 were obtained for Spatial Aptitude (S), Clerical Perception (Q), and Motor Coordination (K).

There is variation among the aptitudes with regard to age of onset of decline. Intelligence (G) and Numerical Aptitude (N) show no decline until about age 42. Clerical Perception (Q), Motor Coordination (K), Finger Dexterity (F), and Manual Dexterity (M) show little or no decline until about age 32. Spatial Aptitude (S) and Form Perception (P) begin to decline before age 20. After the age of onset, the decline with age is approximately linear for all aptitudes.

Implications for Counselors

Results of the age curve studies indicate that there is some decline in average aptitude scores with age for all aptitudes except Verbal Aptitude and that there is variation among the aptitudes with regard to age of onset of decline. It is most important to keep in mind that the age curves were constructed on the basis of average scores and that any interpretations of the results must also be in terms of averages. This fact has two implications for counselors:

1. Since individual differences in rates of change of aptitude scores with age are likely to be substantial, age curves for many individuals may differ considerably in shape from the curves based on average scores. This means that predictions about progress of change in aptitude scores with age for a particular individual are not appropriate.
2. Although average scores tend to decline with age, many older individuals score higher than many younger individuals. This means that generalizations of the findings for purposes of making a conclusion about the aptitude level of an individual without testing him are not appropriate.

INTERRELATIONSHIPS AMONG AGE, GATB APTITUDE SCORES, AND JOB PERFORMANCE

Studies have been completed by two State agencies on the interrelationship of age, GATB aptitude scores and job performance for the occupation of Sewing Machine Operator. This occupation was chosen for study because of the availability of the well-validated USTES aptitude test battery that had been developed for this occupation. (See Chapter 9 of this Section.)

Development of Norms Based on Younger Worker Samples

New York study. The study was conducted in 1957. The sample consists of 61 older (age 45 and older) and 61 younger (age 44 and younger) women employed as Sewing-Machine Operators, Style Garments 786.782. The 122 individuals were employed in 91 different establishments.

The mean age of the older worker subsample was 50.9 years, with a standard deviation of 5.3 years. The mean age of the younger worker subsample was 37.7 years, with a standard deviation of 5.5 years. The mean education of the older worker subsample was 8.4 years, with a standard deviation of 1.4 years. The mean education of the younger worker subsample was 9.7 years, with a standard deviation of 1.5 years. The difference in mean education between the older and younger worker subsamples was significant at the .01 level. The mean experience of the older worker subsample was 24.5 years, with a standard deviation of 7.6 years. The mean experience of the younger worker subsample was 15.3 years, with a standard deviation of 6.7 years. The difference in a mean experience between the older and younger worker subsamples was significant at the .01 level.

Both subsamples were tested with the entire GATB, B-1002, Form A. The criterion of job performance in the study consisted of ratings by first-line supervisors on a descriptive scale developed for the study.

One of the best validated of USTES aptitude test batteries is the battery developed for Sewing-Machine Operator on the basis of data from samples containing both older and younger workers. (See Chapter 9 of this Section.) The aptitudes included in this test battery are Form Perception (P), Motor Coordination (K), Finger Dexterity (F), and Manual Dexterity (M.) Combinations of these aptitudes, with appropriate cutting scores, were evaluated against the dichotomized rating criterion to develop aptitude norms on the basis of data for the younger worker subsample. The set of norms with the best selective efficiency for this subsample consisted of K-85, F-90, and M-80.

Michigan study. The study was conducted in 1959. The sample consists of 32 older (age 45 and older) and 32 younger (age 44 and younger) women employed as Glove Sewer 787.782. The individuals in the sample all worked in the same plant.

The mean age of the older worker subsample was 54.8 years, with a standard deviation of 6.1 years. The means age of the younger worker subsample was 31.4 years, with a standard deviation of 8.6 years. The mean education of the older worker subsample was 8.8 years, with a standard deviation of 1.7 years. The mean education of the younger worker subsample was 10.4 years, with a standard deviation of 1.7 years. The difference in mean education between the older and younger subsamples was significant at the .01 level. The mean experience of the older worker subsample was 19.6 years, with a standard deviation of 7.6 years. The mean experience of the younger worker subsample was 5.6 years, with a standard deviation of 5.6 years. The difference in mean education between the older and younger worker subsample was significant at the .01 level.

The younger worker subsample was tested with the entire GATB, B-1002, Form A. In order to minimize the difficulty which older individuals might experience with the separate-answer-sheet format of B-1002, the older worker subsample was tested with B-1001, except for Parts C, F, and G. B-1001 scores were converted to B-1002 equivalents to permit direct comparisons with the younger worker subsample. The criterion of job performance in the study consisted of ratings on a descriptive rating scale developed for the study.

As in the New York study, combinations of Aptitudes P, K, F, and M with appropriate cutting scores were evaluated against the dichotomized rating criterion to develop aptitude norms on the basis of data for the younger worker subsample. The set of norms with the best selective efficiency for this subsample consisted of P–80, K–90, and M–105.

Cross-Validation of Norms on Older Worker Samples

The norms developed on the basis of data for the New York younger worker subsample were applied to the data for each of the Michigan subsamples. The norms developed on the basis of data for the Michigan younger worker subsample were applied to the data for each of the New York subsamples. No significant relationships were obtained between the norms and dichotomized criteria.

National aptitude norms previously developed for Sewing-Machine Operator (see Chapter 9 of this Section for validity data) consist of P–75, K–75, F–80, M–75. These norms, developed on the basis of data for samples consisting of older and younger workers, were applied to the data for each of the two New York subsamples and the two Michigan subsamples. Significant relationships between the norms and dichotomized criterion were obtained for the New York younger subsample ($\phi=.31$) and the Michigan older worker subsample ($\phi=.40$).

Discussion

The results are inconclusive. Since the norms developed from data for the younger worker subsamples did not show a significant relationship to success for either the younger or older worker cross-validation samples, there is no basis for evaluating the relative adequacy of the norms for older and younger workers. However, there is some evidence that norms developed on the basis of extensive data from both younger and older workers predict success for both older and younger worker groups. Although the national norms for Sewing-Machine Operator did not have a significant cross validity for all four of the subsamples, these norms did have a significant relationship with the criterion for one of the older and one of the younger subsamples.

EFFECTS OF APTITUDE SCORE ADJUSTMENTS FOR AGE ON PREDICTION OF JOB PERFORMANCE

This section is concerned with research on one aspect of interrelationships of aptitudes, job performance and age. Specifically, the research is on validity of age adjustments for aptitudes in prediction of job performance. The age adjustments referred to are those typically used to develop age norms, so that the average adjusted test score is the same for all age groups. The question of the desirability of making such adjustments to develop age norms for intelligence and aptitude tests is an old one which had not been resolved. Ultimately, the basis for deciding between unadjusted and age-adjusted aptitude scores lies in the relative validity of the two sets of scores in prediction of performance for appropriate occupational samples.

Experimental Design Requirements

A study of the relative validity of unadjusted and age-adjusted aptitude scores requires a longitudinal rather than a cross-sectional design for the following reasons.

1. Maintenance of ability once acquired is not the same as acquisition of a new ability. The typical situation in cross-sectional studies is that the employed workers have been trained and have acquired the basic skills required on the job. Job skills of these experienced workers are constantly being reinforced with experience so that, for some occupations, performance may not change to any extent with age. However, ability to *learn* the job may change considerably with age, and learning ability may be a factor of great importance to the employer.

2. In cross-sectional studies it is often difficult to obtain comparable measures of job performance for individuals in the various age intervals. For example, the older, more experienced workers may tend to occupy the most favorable work positions so that their performance cannot be compared directly to the performance of younger workers. Similarly, supervisory ratings may be biased in favor of the more experienced (and older) workers.

3. As pointed out in a report on a cross-sectional study of age and job performance of Federal Mail Sorters (Walker, 1964) "The composition of the youngest age group is not strictly comparable to that of succeeding age groups. The youngest group includes the ambitious and the superior as well as the less ambitious and inept. Through the years, the characters of the age groups change as the substandard are discharged and some of the superior are promoted. The oldest age groups of sorters, therefore, contain more of the acceptable workers with longer experience but fewer of the superior workers since these were selected for promotion or transfer to more attractive work." This is the typical situation in cross-sectional studies, with little or no basis for an assumption of comparability of the younger and older groups.

The ideal design for investigating the applicability of adjustments in aptitude scores for age should have the following characteristics:

1. The design should be longitudinal, i.e., individuals in the sample should be tested with the aptitude tests before they are hired or selected for training, but test results should not be a factor in the selection.

2. Only applicants without previous experience or training in the occupation studied should be included in the sample. This is an important requirement because aptitude tests are designed for use in predicting ability to acquire *new* skills.

3. The sample should cover a wide range to permit meaningful comparison of unadjusted and age-adjusted sets of scores.

4. The criterion should be a measure of training success or early job success.

Procedure

Studies reported earlier in this chapter on the relationship between GATB aptitude scores and age for adults show that all aptitudes except Verbal Aptitude (V) decline with age and that there is variation among the aptitudes with regard to age of onset of decline. In these studies age curves were constructed showing the relationship between average scores on each aptitude and age over an age range from 17 to 72. Availability of reasonably good age curve data for GATB aptitudes made possible the development of experimental age norms for the aptitudes. That is, obtained scores could be adjusted so that the average adjusted aptitude score was the same throughout the age range. Since there was a marked decline in obtained scores with age on most of the aptitudes, the corresponding adjustments were substantial for older individuals.

Eleven previously conducted test development studies were selected for analyses to determine relative validity of unadjusted and age-adjusted aptitude scores. Basic information on these studies is shown in Table 18–7.

The following characteristics of these studies should be noted:

1. All were conducted using a longitudinal design; i.e., the individuals in the samples were tested prior to entry on the job or into the training course, but the aptitude scores were not used in selection.

2. Six of the samples consisted of employed workers in specific occupations; five consisted of trainees for specific occupations.

3. The last three digits of the DOT (3rd edition) code reflect the complexity of the occupation (U.S. Department of Labor, 1965). A wide range of complexity is represented in the eleven samples.

Table 18–8 shows data on age and education for each of the samples. Note that there is a relatively wide range of age for each sample. This was an important consideration in the selection of the studies for the present investigation. Two of the studies have significant negative correlations between age and the criterion and two others have significant positive correlations between education and the criterion.

Results

Means and standard deviations of unadjusted and age-adjusted aptitude scores for the eleven samples are shown in Table 18–9. The age adjustments were made from the age curves obtained from the four-state sample in the study on the relationship between GATB aptitude scores and age for adults. For each aptitude, the age group with the highest aver-

Table 18–7. Information on Studies Included in the Analysis

Occupation	D.O.T. Code	N	Type of Criterion
Assembler, Dry Cell and Battery	727.887	94	Supervisory Ratings
Automobile-Body Repairman	807.381	56	Instructor's Ratings
Clerk-Stenographer	202.388	118	Instructor's Ratings
Cooling–Conveyor Operator	921.883	64	Supervisory Ratings
Fireworks Assembler	737.887	73	Supervisory Ratings
Distribution Clerk	231.688	80	Work Sample
Maintenance Man, Building	899.381	86	Instructor's Ratings
Mill Inspector	619.381	70	Supervisory Ratings
Psychiatric Aid	355.878	73	Instructor's Ratings
Hand Sewer, Shoes	788.884	64	Instructor's Ratings
Tool-and-Die Maker	601.280	124	Supervisory Ratings

age score was identified. This average score was then used as the base point for making score adjustments for individuals in other age groups. The means and standard deviations of unadjusted scores may be compared to a mean of 100 and a standard deviation of 20 for the GATB General Working Population sample.

The data in Table 18–9 show that there is variation among samples with regard to the extent to which age adjustments affect means and standard deviations of aptitude scores. There is similar variation among the aptitudes for the separate samples. Notice that the age adjustments always result in increases in mean

Table 18–8. Mean (M), Standard Deviation (S.D.), Range and Product-Moment Correlation with the Criterion (r) for Years of Age and Years of Education

Occupation	Years of Age				Years of Education			
	M	S.D.	Range	r	M	S.D.	Range	r
Assembler, Dry Cell and Battery	29.0	9.1	18-51	.03	9.6	1.9	6-14	.10
Automobile-Body Repairman	28.6	7.5	18-51	−.03	10.4	1.7	6-14	−.02
Clerk-Stenographer	26.0	9.5	17-58	−.34**	12.0	.7	9-14	−.09
Cooling-Conveyor Operator	36.8	7.7	23-54	.14	10.7	2.5	1-16	.10
Fireworks Assembler	35.3	6.9	21-51	−.36**	11.6	.9	8-12	.04
Distribution Clerk	33.1	9.4	18-53	.16	12.7	1.7	9-16	.13
Maintenance Man, Building	41.9	9.6	19-59	.07	9.8	1.6	6-12	.01
Mill Inspector	29.2	8.6	18-52	−.15	12.1	2.4	6-17	.25*
Psychiatric Aid	25.3	7.5	17-52	.16	12.1	.7	10-14	.04
Hand Sewer, Shoes	30.5	13.3	16-60	.12	9.0	2.0	6-14	.04
Tool-and-Die Maker	23.5	4.0	19-37	−.16	12.1	.8	10-16	.18*

*Significant at the .05 level.
**Significant at the .01 level.

scores and usually result in decreases in variability of scores.

Table 18–10 shows the correlation between the criterion of performance on the job or in training and the unadjusted and age-adjusted aptitude scores. Many of the validity coefficients are statistically significant for both unadjusted and age-adjusted aptitude scores. Table 18–11 shows the differences in validity coefficients of the age-adjusted and unadjusted aptitude scores. Small differences are significant in some instances because of high correlations between unadjusted and age-adjusted scores. Table 18–12 shows the distribution of the validity differences for all nine aptitudes and eleven samples. The median difference is .00.

Discussion

The results indicate that, in some instances, aptitude scores adjusted for age have validities that are significantly different from validities of unadjusted scores. The sign and direction of the difference are dependent on the occupation, the age range represented in the sample, and the particular aptitude. These factors are discussed below:

1. With reference to the occupations included in this investigation, age adjustments in the aptitude scores resulted in substantially higher validity for only one occupation (Cooling-Conveyor Operator), but such adjustments resulted in substantially lower validities for two occupations (Clerk-Stenographer and Fireworks Assembler). For the remaining eight occupations the differences between age-adjusted and unadjusted score validities were quite small.

2. An important consideration in the selection of the particular eleven samples for this investigation was the age range represented in the sample. An attempt was made to include samples with high variability in years of age so that differences in unadjusted and age-adjusted sets of scores would be maximized. Obviously, in studies based on samples which do

Table 18–9. Means and Standard Deviations of Unadjusted and Adjusted GATB Aptitude Scores for the Eleven Samples

Occupation	Aptitudes of the General Aptitude Test Battery								
	G	V	N	S	P	Q	K	F	M
Assembler, Dry Cell and Battery									
Mean	90.7	90.3	90.7	94.4	97.6	97.5	96.4	104.1	100.0
	92.5	94.2	92.3	99.5	103.8	101.6	99.8	104.2	103.5
S.D.	13.4	12.5	15.7	16.5	17.8	15.7	15.8	19.2	18.4
	13.2	13.1	15.4	15.4	15.3	14.8	16.0	19.4	18.8
Automobile-Body Repairman									
Mean	96.3	93.3	89.7	110.2	96.9	95.7	88.7	104.6	103.6
	97.5	96.9	91.2	114.6	102.4	98.8	91.3	106.9	106.3
S.D.	15.3	15.0	15.0	17.2	15.9	15.5	20.2	19.9	19.9
	15.2	14.0	14.9	17.1	16.1	15.3	20.7	19.8	19.4
Clerk-Stenographer:									
Mean	97.4	97.0	100.4	98.4	103.8	105.6	112.2	100.1	103.1
	98.9	101.6	101.7	101.6	107.9	108.5	114.7	102.4	106.1
S.D.	14.9	12.3	14.9	17.9	20.0	14.2	16.4	19.4	20.4
	15.1	12.4	14.9	18.1	18.2	13.6	15.8	18.3	19.7

***Table 18–9. Means and Standard Deviations of Unadjusted and Adjusted GATB Aptitude Scores for the Eleven Samples*—Continued.**

Occupation	Aptitudes of the General Aptitude Test Battery								
	G	V	N	S	P	Q	K	F	M
Cooling-Conveyor Operator									
Mean	92.1	87.2	90.9	97.4	87.4	74.1	72.6	94.1	94.3
	94.2	89.2	93.0	105.9	99.7	81.1	79.0	100.9	101.1
S.D.	15.7	11.9	16.9	18.1	16.6	14.2	17.5	20.4	18.6
	16.3	12.2	16.8	17.6	15.5	14.2	16.9	19.3	17.9
Fireworks Assembler									
Mean	93.1	92.3	89.8	98.4	90.8	85.7	89.8	113.4	117.6
	95.1	94.6	91.9	105.8	101.5	91.7	95.3	118.7	123.2
S.D.	15.5	16.5	18.8	17.0	16.4	16.5	19.8	16.2	17.9
	15.7	16.6	18.8	16.5	15.7	15.8	19.3	14.7	17.3
Distribution Clerk									
Mean	97.2	100.1	98.8	97.4	102.2	105.9	107.0	98.8	107.8
	98.9	102.9	100.6	99.0	111.7	111.3	111.7	104.9	113.1
S.D.	14.7	15.1	15.7	17.4	16.6	14.9	16.0	17.8	19.0
	14.9	14.7	15.6	17.6	16.2	14.8	16.6	18.4	19.5
Maintenance Man, Building									
Mean	88.8	91.2	85.4	91.6	82.1	88.7	84.9	75.4	88.5
	91.9	93.1	88.2	102.1	98.6	98.3	94.0	87.1	100.4
S.D.	15.3	14.5	17.0	16.2	17.9	12.8	21.8	19.5	23.6
	15.7	14.4	17.3	16.4	18.0	13.5	21.0	19.7	23.8
Mill Inspector									
Mean	103.5	92.3	101.7	109.0	96.8	85.2	83.2	98.6	99.7
	105.1	95.9	103.1	114.1	103.2	88.8	86.4	101.8	103.1
S.D.	20.0	16.9	18.6	19.1	15.5	14.4	18.2	19.9	19.3
	19.8	16.8	18.6	18.2	14.0	14.1	17.6	18.4	18.3
Psychiatric Aid									
Mean	106.0	104.9	102.0	108.5	111.5	106.5	108.2	104.2	112.0
	107.1	109.3	103.0	111.6	115.1	108.8	109.9	105.8	114.1
S.D.	13.4	13.5	12.9	16.2	16.5	12.5	14.5	20.1	27.4
	13.6	13.5	13.1	16.5	16.9	12.6	14.2	19.6	26.5
Hand Sewer, Shoes									
Mean	90.1	86.7	86.4	100.0	94.7	93.1	95.4	98.5	113.8
	92.2	89.5	88.3	105.8	103.0	98.5	100.3	104.1	120.0
S.D.	16.3	13.9	18.8	19.0	18.7	13.5	18.6	25.1	25.3
	16.4	16.1	19.1	19.4	19.3	14.2	19.8	23.9	24.6
Tool-and-Die Maker									
Mean	111.7	98.8	107.8	118.5	111.7	96.5	102.5	104.5	122.4
	112.6	103.6	108.6	120.6	113.6	97.8	103.3	105.0	123.4
S.D.	14.8	13.7	14.7	16.3	15.3	15.6	16.6	18.0	17.4
	15.0	13.9	14.9	16.4	15.3	15.7	16.7	18.1	17.4

Table 18–10. Correlations Between the Criterion and the Unadjusted and Adjusted GATB Aptitude Scores for the Eleven Samples

Occupation	Aptitudes of the General Aptitude Test Battery								
	G	V	N	S	P	Q	K	F	M
Assembler, Dry Cell and Battery	.11	.20	.09	.11	.27**	.16	.45**	.48**	.50**
	.11	.15	.09	.14	.29**	.16	.43**	.47**	.46**
Automobile-Body Repairman	.09	−.03	.10	.13	.35**	.27*	.19	.17	.29*
	.09	.04	.12	.14	.34*	.26*	.18	.14	.26
Clerk-Stenographer	.50**	.47**	.49**	.40**	.46**	.48**	.26**	.34**	.25**
	.48**	.50**	.48**	.33**	.38**	.42**	.19*	.26**	.17*
Cooling-Conveyor Operator	.26*	.10	.16	.45**	.41**	.14	.32**	.59**	.55**
	.26*	.07	.18	.48**	.48**	.17	.36**	.66**	.60**
Fireworks Assembler	.37**	.04	.55**	.33**	.38**	.42**	.38**	.68**	.55**
	.35**	.05	.55**	.28	.28*	.35**	.33**	.61**	.46**
Distribution Clerk	.37**	.48**	.35**	.10	.34**	.32**	.38**	.21	.12
	.38**	.48**	.37**	.14	.38**	.35**	.40**	.23*	.14
Maintenance Man, Building	.33**	.35**	.37**	.19	.35**	.24*	.04	.27*	.18
	.32**	.34**	.37**	.21*	.39**	.26*	.05	.28**	.18
Mill Inspector	.44**	.30*	.42**	.42**	.31**	.27*	.16	.23	.29*
	.45**	.32**	.42**	.43**	.28*	.25*	.13	.20	.25*
Psychiatric Aid	.43**	.56**	.30**	.08	.01	.22	.24*	.13	−.03
	.44**	.54**	.32**	.13	.05	.25*	.25*	.13	−.04
Hand Sewer, Shoes	.25*	.08	.20	.35**	.15	.20	.19	.36**	.33**
	.23	.09	.20	.37**	.16	.18	.17	.36**	.30*
Tool-and-Die Maker	.35**	.09	.37**	.45**	.48**	.28**	.17	.23*	.30**
	.35**	.10	.37**	.43**	.46**	.27**	.17	.22*	.30**

*Significant at the .05 level.
**Significant at the .01 level.

not have a wide age range, substantial differences between validities of unadjusted and age-adjusted scores are not so likely to occur.

3. The aptitudes with smallest differences in validity of unadjusted and age-adjusted scores were Intelligence, Verbal Aptitude, and Numerical Aptitude. For these aptitudes validity appears to be largely unaffected when aptitude scores are adjusted for age. The primary reason for this appears to be the fact that these three aptitudes show little or no decline with age, whereas the other aptitudes all show relatively sharp decline in average score with age after the age of onset of decline.

Summary

The question of adjusting aptitude and intelligence test scores for age to develop age norms is an old one which has not been resolved. Ultimately, the basis for deciding between unadjusted and age-adjusted scores lies in comparison of the relative validity of the two sets of scores in prediction of performance for appropriate occupational samples.

The U.S. Training and Employment Service has a continuing program of aptitude validation studies on specific occupations, using the entire General Aptitude Test Battery as the experimental battery. Eleven of these studies were selected for analyses to determine rela-

Table 18–11. Differences in Validity Coefficients of Age–Adjusted and Unadjusted Aptitude Scores for the Eleven Samples

Occupation	Aptitudes of the General Aptitude Test Battery								
	G	V	N	S	P	Q	K	F	M
Assembler, Dry Cell and Battery	.00	.05	.00	−.03	−.02**	.00	.02**	.01	.04
Automobile-Body Repairman	.00	−.07	−.02	−.01	.01	.01	.01	.03	.03
Clerk-Stenographer	.02	−.03**	.01	.07**	.08**	.06**	.07**	.08**	.08**
Cooling-Conveyor Operator	.00	.03	−.02	−.03	−.07	−.03	−.04	−.07*	−.05
Fireworks Assembler	.02*	−.01	.00	.05*	.10*	.07**	.05**	.07	.09**
Distribution Clerk	−.01	.00	−.02*	−.04	−.04	−.03	−.02	−.02	−.02
Maintenance Man, Building	.01	.01	.00	−.02	−.04	−.02	−.01	−.01	.00
Mill Inspector	−.01	−.02	.00	−.01	.03	.02	.03	.03	.04
Psychiatric Aid	−.01	.02	−.02	−.05	−.04	−.03	−.01	.00	.01
Sewer Hand, Shoes	.02	−.01	.00	−.02	−.01	.02	.02	.00	.03
Tool-and-Die Maker	.00	−.01	.00	.02	.02	.01	.00	.01	.00

*Significant at the .05 level; **Significant at the .01 level.

Note.—Positive differences indicate validity of unadjusted is higher; negative differences indicate validity of age-adjusted is higher.

Table 18–12. Distribution of Differences in Validity Coefficients of Age-Adjusted and Unadjusted Aptitude Scores

Differences in Validity (Unadjusted—Adjusted)		
Interval	Mid Point	Frequency
.08 to .10	.09	5
.05 to .07	.06	8
.02 to .04	.03	19
—.01 to .01	.00	39
—.02 to —.04	—.03	23
—.05 to —.07	—.06	5

tive validity of unadjusted and age-adjusted aptitude scores. The following characteristics of these studies should be noted:

1. All were conducted using a longitudinal design; i.e., the individuals in the samples were tested prior to entry on the job or into the occupational training course, but the aptitude scores were not used in selection.

2. Six of the samples consisted of employed workers in specific occupations; five consisted of trainees for specific occupations.

3. A wide range of complexity was represented in the eleven occupations.

4. The number of cases in the samples varied from 56 to 124.

5. There was a relatively wide range of age for each sample.

For each of the eleven samples the criterion of performance on the job or performance in the occupational training was correlated with two sets of aptitude scores. One set consisted of unadjusted scores on each of the GATB aptitudes. The second set consisted of these GATB scores adjusted for age. The adjustments were made on the basis of the age curves obtained from a previous study on the relationship between GATB aptitude scores and age for adults.

An analysis of the differences between the validity coefficients of the unadjusted and age-adjusted aptitude scores showed that (1) most differences were not statistically significant, and (2) the size and direction of the significant differences depended on the occupation, the age range represented in the sample and the aptitude measured. The Employment Service does not use separate norms for older workers because there is insufficient evidence that they would be warranted.

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19. Effect of Disabilities on Aptitude Scores

Several GATB studies have been conducted on samples of individuals who are physically or mentally disabled. Results of these studies are summarized in this chapter.

EMOTIONALLY DISTURBED

A study done at Maudsley Hospital in London, England in 1950 showed that dexterity test scores were quite different for neurotics, psychotics, and normals.

Personnel at the hospital administered GATB Parts 9–12 to 50 individuals diagnosed as neurotics, 50 individuals diagnosed as psychotics, and 50 controls consisting mostly of psychologists and psychiatrists. The results, in terms of means and variances for controls, neurotics, and psychotics are shown in Table 19–1.

Table 19–1. Means and Variances for Controls, Neurotics, and Psychotics on GATB Parts 9–12

Part		Controls N=50	Neurotics N=50	Psychotics N=50
9	Mean	76.060	78.760	65.880
	Variance	81.160	71.492	117.455
10	Mean	92.580	85.500	75.180
	Variance	83.391	57.684	182.967
11	Mean	29.020	23.940	21.220
	Variance	21.898	14.017	31.808
12	Mean	27.340	24.720	21.420
	Variance	15.290	13.144	20.371

F ratios computed from analysis of variance showed that the differences among means of the three groups were significant for each Part.

Additional analysis was done to determine the extent to which combinations of scores on Parts 9–12 predict group membership. For this purpose a separate analysis was done for each pair of groups. The multiple correlations for predicting membership in pairs of groups were as follows: control-neurotic dichotomy, $R = .64$; control-psychotic dichotomy, $R = .68$; neurotic-psychotic dichotomy, $R = .56$.

This is the only formal study relating dexterity scores to diagnoses of emotional disturbance. However, several psychologists who have used the GATB in counseling mental patients have commented on the tendency for scores on the dexterity aptitudes to be lower than scores on the other aptitudes. An example is an article by Floyd (1964) in which he describes his use of the GATB with mental patients at the South Carolina State Hospital.

MENTALLY RETARDED

One of the contributions of the GATB is that it provides for measurement of a variety of aptitudes important for occupational success, not just "intelligence." If such differential aptitude measurement is important generally in the vocational counseling of individuals with normal intelligence, it is critically important in counseling intellectually retarded individuals. Several GATB studies have been done to determine the extent to which retarded individuals perform well on tests of aptitudes other than intelligence.

Local Office Applicants

This study was described in detail in articles by Murray in the *Vocational Guidance Quarterly* (1956) and the *Employment Security Review* (1956).

In 1955 GATB data were collected on 249 individuals with Aptitude G scores of 75 and under from local offices in New York City; Erie, Pennsylvania; and Philadelphia, Pennsylvania. Analysis of the data from these 249 individuals showed that 71, or 28.5 percent, had scores of 110 or better on one or more of the other aptitudes; 131, or 52.6 percent, had scores of 100 or better on one or more of the other aptitudes; 187, or 72.1 percent, had scores of 90 or better on one or more of the other aptitudes.

Table 19–2. Distribution of 128 Cases in Which Individuals Had "G" Score of 75 or Under and 100 or More on Another Aptitude

	Cases with Scores of 100 or Higher	
	Number	Percent
Verbal	0	0
Numerical	2	1.5
Spatial	6	5
Form Perception	34	27
Clerical Perception	23	18
Motor Coordination	70	54
Finger Dexterity	42	33
Manual Dexterity	56	44

Table 19–2 shows the number and percentage of individuals with "G" scores of 75 and under who achieved scores of 100 or more on other aptitudes.

It will be noted that no applicant with a "G" score of 75 or less had a score of 100 or better on Verbal Aptitude, but on each of the other aptitudes some applicants achieved better than average scores. A large number achieved good scores in Motor Coordination, Finger Dexterity, and Manual Dexterity. As the scores indicate, not all those in the group have these abilities, but a great many do. Moreover, while it cannot properly be said that a person compensates for low intelligence by high abilities in other aptitudes, other high aptitudes frequently do appear concurrently with low intelligence.

Rochester, New York Students

In 1965 the New York agency completed a study in which the GATB was administered to a total of 112 males and 46 females classified as "slow learners" and to 46 males and 47 females classified as "educable mental retardates" in order to explore their occupational potential. The classification "slow learner" was determined by an IQ in the approximate range of 76–89 and/or evidence of a low level of academic functioning. The mentally retarded group consisted of individuals who, in general, had IQ's of 75 and below. These students were enrolled at four high schools in Rochester, New York, and were tested in their terminal year in special programs designed to prepare them to enter occupations. Two groups of "normal" high school seniors (a total of 336 males and 348 females) were used for comparison purposes. For the retarded and slow learner groups, more than the usual number of testing personnel were present at the time of testing to facilitate handling of the practice exercises and to maintain the motivation and pace needed for optimum performance.

Significant differences were found between the mean scores of the three groups on all aptitudes (with retardates scoring the lowest and "normals" the highest). On all Parts of the GATB, the "normals" attempted more items than the slow learners, who attempted more items than the mentally retarded.

There has been some question as to the reliability of the GATB when used with low ability individuals. A test that is very difficult for lower ranges of ability might result in inordinate guessing or failure to differentiate among individuals at these lower levels. Analyses of the data indicated that for most Parts of the GATB guessing was not a factor for the items attempted by the mentally retarded and slow learner groups, and that the items attempted were at a level of difficulty that permitted differentiation among them.

Less than half of the mentally retarded group (males 39%, females 45%) qualified for one or more Occupational Aptitude Patterns (OAP), but more encouraging results were obtained concerning the occupational potential of slow learners. In this group, 76% of the males and 63% of the females qualified for one or more OAP's.

Pennsylvania Students

The data reported here are from a study conducted by Huddy (1968) for his doctoral dissertation at Syracuse University. The sample consisted of 220 students (121 ninth graders and 99 tenth graders) whose IQ's as measured through individual testing, were within the range 50–89. The students were from schools throughout Pennsylvania. Table 19–3 shows data on OAP's passed by these mentally retarded and slow learning students.

Table 19–3. OAP's Passed by Mentally Retarded and Slow Learning Students in Pennsylvania

IQ Range	Number of Pupils	Number of Pupils Passing One or More OAP's	Average Number of OAP's per Pupil
80–89	42	26	3.8
70–79	104	59	3.2
60–69	54	21	1.8
50–59	20	2	.6

The results indicate that, although the GATB did not identify occupational potential among most of those in the lowest IQ level (IQ 50–59), it is potentially useful for those above this IQ range.

DEAF

The deaf population presents a unique situation in aptitude testing involving verbal material. "Owing to their general retardation in linguistic development, deaf children are usually handicapped on verbal tests, even when the verbal content is presented visually (Anastasi, 1968, p. 265)." The purpose of this section is to (1) summarize available results of GATB testing with deaf populations and (2) compare their performance on GATB Aptitude G, measured by tests of verbal content, with performance on the USES Nonreading Measure of General Learning Ability (U.S. Department of Labor, 1963).

Procedure

The data were collected by four State Employment Service agencies (Connecticut, Louisiana, Michigan, and New Mexico) from 1958 through 1969. At the time of testing all subjects were students in various schools for the deaf. Table 19–4 shows the sample characteristics in terms of age, education, percent male, and number of cases in each participating State.

Table 19–4. Sample Characteristics

State	Number in Sample	Age in Years			Education in Years		% Male
		Range	M	σ	M	σ	
Conn.	44	16–21	18.3	1.5	9.9	.2	57
La.	49	16–22	17.9	1.4	11.5	.5	55
N.M.	23	15–20	17.9	1.3	10.0	1.8	35
Mich. (a)	164	18–20	18.4	.9	11.3	.2	60
Mich. (b)	128	16–20	18.0	.8	11.3	.1	59

(a) Tested 1958–1964.
(b) Tested 1968–1969.

The following instruments were used:

1. The GATB, B–1002A.
2. The USES Nonreading Measure of General Learning Ability (Nonreading G), a weighted composite of scores on the first three parts of the Cattell Culture Fair Test[1] (Part 1—Figure Series; Part 2—Figure Classification; and Part 3—Matrices) and Part 7—Form Matching of the GATB.

The instruments were administered by teams composed of State Employment Service personnel and school instructors. The method of administration varied from State to State. The GATB was administered to all samples; the Nonreading G was administered only in Louisiana and New Mexico.

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[1] Available from the Institute for Personality & Ability Testing, 1602-04 Coronado Drive, Champaign, Illinois 61820 or Bobbs-Merrill Co., Inc., 4300 West 62nd Street, Indianapolis, Indiana 46206.

Test Administration Procedures Used in Data Collection

Connecticut. The GATB was administered by two test administrators and a member of the school staff in each testing session. Written instructions, explaining the purpose of the test and what signals would be used, were given to the students the day before testing. Students were encouraged to ask questions if they did not understand the instructions. The test administrator read the standard instructions and a school staff member stood next to him and relayed the instructions by means of sign language. The practice exercises were checked and any additional instructions to an individual were usually given by paper and pencil. The written parts of the GATB were started by a hand signal and ended with a flick of the lights. Slow demonstrations with flourishes to emphasize certain points were used in addition to reading and sign language to administer the dexterity parts of the GATB.

Louisiana. The GATB and the USES Nonreading Measure of General Learning Ability were administered according to standard instructions by an Occupational Test Development Analyst and a school staff member. The Analyst read the instructions and the school staff member translated the instructions into sign language. All parts were started by the sudden dropping of the Analyst's hand, and the signal to stop was the turning off of the lights in the room.

Michigan. The GATB instructions were given orally by the test administrator and in sign language by a school instructor. After the general instructions were given for each test, specific practice exercises were either written on a blackboard or presented through the use of prepared charts. Timing was accomplished by switching the lights off and on in the testing room.

New Mexico. The GATB and USES Nonreading Measure of General Learning Ability were administered according to the standard instructions by a test administrator and a school instructor. The instruments were administered with a ratio of one monitor to eight students. Before testing was begun the instructor explained in sign language to the students the reason for the testing and how results would be used. The students were told to raise their hands and ask questions if there was any part of the test they did not understand. Instructions were read aloud by the test administrator and interpreted to the students in sign language by the school instructor. Signals to begin and to stop working on each part were made by flicking the lights on and off.

Results

Table 19–5 shows the means and standard deviations of the GATB aptitude scores for all

Table 19–5. Means (M) and Standard Deviations (σ) of GATB Aptitude Scores

GATB Aptitude	Conn.		La.		N.M.		Mich. (a)		Mich. (b)		Total	
	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ
G	81.0	12.7	75.7	12.8	74.7	10.9	81.3	14.9	81.0	22.0	80.1	17.0
V	73.0	6.7	72.6	6.3	74.2	6.0	74.2	8.3	72.7	6.5	73.4	7.3
N	83.0	18.7	82.4	17.9	77.4	15.8	85.5	18.8	87.0	26.7	84.9	21.5
S	101.0	21.7	96.0	18.4	95.1	16.6	105.6	20.2	109.2	29.0	104.5	23.6
P	110.0	24.5	108.9	16.6	105.9	16.5	112.4	23.3	116.0	32.0	112.5	22.5
Q	95.0	17.3	97.9	19.1	96.3	14.6	104.6	18.8	109.0	27.3	103.7	22.2
K	97.0	18.0	113.6	23.6	97.4	18.6	105.6	18.7	104.6	27.9	104.9	23.2
F	106.0	34.0	83.2	21.2	90.8	22.4	109.8	25.3	99.6	31.3	101.9	29.1
M	112.0	31.2	98.1	16.3	104.6	31.7	103.9	26.0	107.2	10.6	105.2	22.7

samples and for the combined total. In all samples, the mean scores obtained on Aptitudes G, V, and N were lower than the mean scores on Aptitudes S, P, Q, K, F, and M. As could be expected, the mean score on Aptitude V was the lowest mean aptitude score in each sample. The standard deviations of Aptitude V ranged from 6.0 to 8.3, indicating that most subjects scored within a relatively narrow range. The weighted mean scores on Aptitudes G, V, and N were approximately one standard deviation below the GATB mean of 100, General Working Population sample. On the other aptitudes the deaf students scored about average or above average. Consistently high mean scores were obtained for Aptitude P, a nonverbal measure of perceptual speed. It is interesting to note that scores averaged almost 10 points higher on Aptitude P than on Aptitude Q, a perceptual speed measure involving verbal content.

Table 19–6 shows the means and standard deviations of the two measures of Aptitude G for the Louisiana and New Mexico samples as well as the combined total. In both samples the mean Nonreading G was considerably higher than the mean GATB Aptitude G. The standard deviations of the Nonreading G were also higher.

Table 19–6. Means (M) and Standard Deviations (σ) of Two Measures of Aptitude G

Aptitude	N.M.		La.		Total	
	M	σ	M	σ	M	σ
GATB G...	74.7	10.9	75.7	12.8	75.4	12.2
Nonreading G........	98.4	14.3	90.4	15.6	93.0	15.6

When Nonreading G is substituted for GATB Aptitude G in comparing scores with Occupational Aptitude Patterns, the number of OAP's on which the deaf qualify increases. A comparison of the number and mean of OAP's passed using GATB Aptitude G and using Nonreading G is presented on Table 19–7.

Discussion

The subjects scored near or above the population mean on all GATB aptitudes except G, V, and N. This is a strong indication that modifications in administration procedures to meet the needs of the deaf were successful. It also indicated that the handicap of the subjects did not limit their performance on the entire GATB. The Nonreading G developed by the Employment Service measures General Learning Ability with the use of nonverbal materials and is a useful addition to GATB Aptitude G as an indicator of general learning ability.

Caution must be used in interpreting results in terms of the OAP structure. Passing a specific set of OAP norms with Nonreading G does not necessarily indicate that the person has the literacy skills needed for a specific job; it implies only that he has the potential. The

Table 19–7. Number (N), Mean (M), and Percent of Increase in OAP's Passed Using Two Measures of Aptitude G

Aptitude G Measure	Louisiana			New Mexico		
	N	Number Passed	M Passed	N	Number Passed	M Passed
GATB G........................	49	430	8.76	23	179	7.78
Nonreading G.................	49	599	12.22	23	465	12.43

literacy level required for a job or training should be determined, and reading achievement tests should be given to determine if this required literacy level is met by the deaf person. Operational use of the GATB and the Nonreading G appears justified when test administrators and counselors are aware of the unique situation of the deaf. When used with proper caution, these instruments will provide an adequate assessment of the deaf person's aptitudes.

Additional Research Needed

1. The development of standardized administration procedures for administering the GATB to a deaf population.
2. Validation of aptitude scores against training and job performance.
3. An investigation of the feasibility of using parts of the Nonreading Aptitude Test Battery (U.S. Department of Labor, 1970) in measurement of aptitudes for deaf populations.

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20. Norms for 9th and 10th Grades

The General Aptitude Test Battery has been widely used in the vocational counseling of high school seniors for the past 20 years. During the 1967–1968 school year, the Employment Service tested about 200,000 seniors for this purpose. Aptitude norms for lower high school grades were originally developed in 1959 (Droege, 1960), and the GATB has been used increasingly by school counselors in the educational-vocational counseling of students at the ninth and tenth grade levels. Several hundred schools have arranged to use the GATB in this way through release agreements between State Employment Services and State Departments of Education or individual schools (Culhane, 1964; Wysong, 1965).

There were limitations in the study that resulted in the 1959 aptitude norms for lower high school grades. The samples were small, the geographical coverage was limited, and the design was horizontal rather than longitudinal. Accordingly, it was decided that a more extensive study utilizing a more adequate longitudinal design and providing for long range validation should be conducted.

In the spring of 1958 a series of three large-scale longitudinal studies was initiated to increase the usefulness of the GATB as a tool for counseling high school students. The overall design involved testing students in the ninth, tenth and eleventh grades and retesting them with an alternate form in the twelfth grade. (There was also provision for testing a control group of students in the twelfth grade at the time students in the lower grades were tested initially.) The first of the three studies was concerned with obtaining longitudinal data on effects of maturation on aptitude scores. The purpose of the second study was to obtain data on validity of GATB aptitude scores for predicting academic success in high school. The purpose of the third study was to obtain data on the validity of GATB aptitude scores and Occupational Aptitude Patterns (See Section II of the *Manual for the GATB*) for predicting success in colleges and occupations two and seven years after high school. Figure 20–1 shows the data collection schedule for the three-study series.

LONGITUDINAL MATURATION STUDY

The primary purpose of the GATB longitudinal maturation study was to investigate effects of the maturation or growth process on aptitude scores. Specific aspects of maturation studied were: (1) stability of aptitude measurement[1] in lower high school grades and (2) average aptitude score increases in high school attributable to effects of maturation or growth. Although maturation was the primary focus in the study, it was possible to obtain data also on effects of practice (previous exposure to GATB testing) on retest aptitude scores as a byproduct of the data analysis.

The importance of stability of aptitude measurement in lower high school grades, and the possible effects of maturation on stability, should be emphasized. Aptitude tests cannot be used with confidence unless there is evidence that they have substantial stability of measurement over a period of time.

A study has shown that the aptitudes of the GATB do have good stability for adult groups when the interval between first and second administration of the test is as long as three years (see Chapter 15 of this Section). But other studies have shown that there may be differences in the rate of progress of the maturation process for individuals who may not have reached full aptitude maturity. Thus, a question arises as to whether individual differences in rate of maturation have a serious det-

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[1] The term "stability of measurement" is used here to refer to the relationship between initial test scores and retest scores for a specified group of individuals.

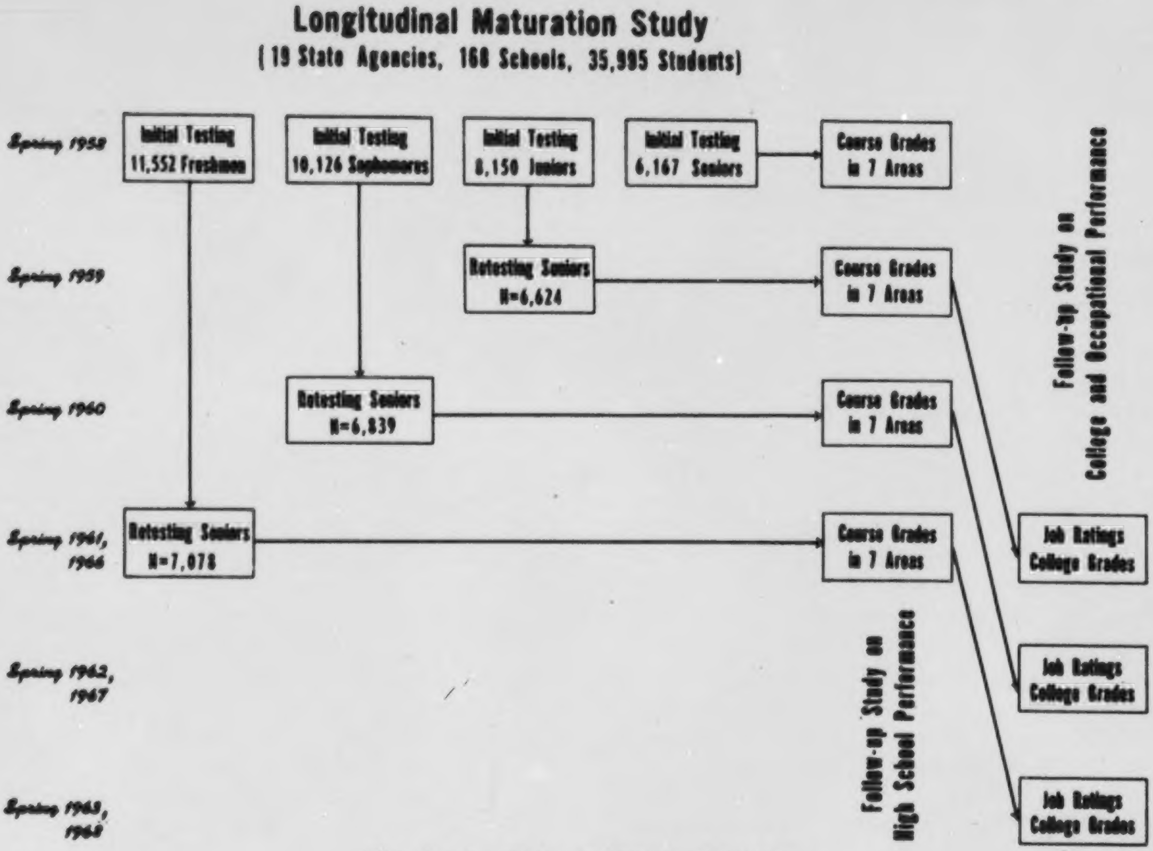
Longitudinal Maturation Study
(19 State Agencies, 168 Schools, 35,995 Students)
Spring 1958
Initial Testing 11,552 Freshmen
Initial Testing 10,126 Sophomores
Initial Testing 8,150 Juniors
Initial Testing 6,167 Seniors
Course Grades in 7 Areas
Spring 1959
Retesting Seniors N=6,624
Course Grades in 7 Areas
Spring 1960
Retesting Seniors N=6,839
Course Grades in 7 Areas
Spring 1961, 1966
Retesting Seniors N=7,078
Course Grades in 7 Areas
Spring 1962, 1967
Spring 1963, 1968
Follow-up Study on College and Occupational Performance
Follow-up Study on High School Performance
Job Ratings College Grades
Job Ratings College Grades
Job Ratings College Grades

Fig. 20–1. Data Collection Schedule.

rimental effect on stability of aptitude measurement in lower high school grades. If so, the test scores of the younger high school students could not be expected to provide stable indications of occupational and educational potentialities. It would follow that use of aptitude tests for long range counseling of students in lower high school grades could not be justified. Some data on GATB aptitude stability for high school samples are available from earlier studies, but they do not represent a systematic effort to obtain data on comparable samples of boys and girls and comparable samples of ninth, tenth and eleventh graders.

Procedure

The experimental design included both test-retest and independent-sample approaches for investigating effects of maturation on test scores. As pointed out before, maturation may affect both stability of measurement and level of aptitude score. An indication of aptitude stability over the period between intitial testing in a lower high school grade and retesting in the twelfth grade is provided by the product-moment correlation between initial test scores and retest scores. But an estimate of the average increase in score level attributable to effects of maturation cannot be made from a simple comparison of initial test and retest data. Some of this increase in scores upon retesting results from the initial testing experiences (practice effect). Estimation of the portion of the increase attributable to practice effects and the portion attributable to maturation is possible through use of an independent control sample. In this study the control sample was the sample tested in the twelfth grade at the time the experimental samples were tested initially in lower high school grades. The control and experimental samples were comparable in the sense that they all included only "survivors" to the same point in the twelfth grade. Comparisons of scores of the control sample with the twelfth grade *retest* scores of the samples tested initially in lower high school grades provides a basis for estimating average practice effects. Comparisons of scores of the control sample with the *initial* scores of samples tested in lower high school grades provide a basis for estimating average maturation effects. When the average effects of practice and maturation are estimated in this way, their sum is equal to the difference between initial test mean score and retest mean score for the experimental samples.

Nineteen State employment services, in cooperation with 168 schools, participated in the data collection. The samples were obtained from schools where it was possible to test students at all grade levels and to retest the ninth, tenth and eleventh graders in the twelfth grade. In most instances, substantially all students in all four high school grade levels of the participating school were tested. When this was not possible, a sample was selected for testing.

The initial testing was done during the period February 1 through April 30, 1958. The twelfth graders were tested with Form A of the B-1002 edition of the GATB. The eleventh, tenth, and ninth graders were tested with Form B of B-1002. They were retested as twelfth graders with Form A during the period February 1 through April 30 in the years 1959, 1960 and 1961, respectively.

Of the 35,995 students initially tested for the study, 26,708 were included in the final samples. Those not in the final samples were excluded for a variety of reasons, including dropout or transfer to other schools during the period between initial testing and retesting, incomplete data available, and absent from school on retesting date. Table 20-1 shows the number of cases in the final samples by grade, sex, and size of school.

Table 20-2 shows the means and standard deviations of years of age at initial testing for the samples. The boys were slightly older and slightly more variable in age than girls at each grade level. Otherwise, there were no irregularities in the age data for the samples.

Aptitude Maturation

Basic data. Table 20-3 shows the GATB aptitude means and standard deviations for the four samples. This table contains basic information used to generate other tables and graphs to be introduced. Before proceeding further, however, the following points about Table 20-3 should be noted:

1. The aptitude mean scores for the twelfth grade sample tended to be somewhat higher than 100, the mean for the GATB General Working Population sample. The standard deviations were lower than 20, the standard deviation for the GATB General Working Population sample.

Table 20-1. Number of Cases in the Final Sample

School Size	Grade 9		Grade 10		Grade 11		Grade 12		Total
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
Under 100	265	313	295	367	247	328	269	310	2,394
100 - 199	537	555	564	551	490	494	490	482	4,163
200 - 399	752	869	722	828	736	809	663	777	6,156
400 and Over	1,844	1,943	1,767	1,745	1,756	1,764	1,606	1,570	13,995
Total	3,398	3,680	3,348	3,491	3,229	3,395	3,028	3,139	26,708

Table 20–2. Mean and Standard Deviation of Years of Age at Initial Testing

Grade	Boys			Girls		
	N	M	S.D.	N	M	S.D.
9.....	3398	14.9	.6	3680	14.8	.5
10.....	3348	15.9	.6	3491	15.8	.5
11.....	3229	16.9	.6	3395	16.8	.5
12.....	3028	17.9	.6	3139	17.8	.5

2. Aptitudes with the largest male-female differences in mean scores were Spatial Aptitude (boys averaged higher), Form Perception, Clerical Perception, Motor Coordination, and Finger Dexterity (girls averaged higher). The findings are consistent, applying equally well to the results for the ninth, tenth, eleventh and twelfth grade samples. These findings confirm results of previous research on sex differences in aptitude scores for high school samples (see Chapter 17 of this Section) and are similar to results obtained for a sample of adults with a wide age range (see Chapter 18 of this Section).

3. Retest mean scores were higher than initial test means, indicating the operation of effects of maturation and/or practice.

Average increases in scores attributable to maturation and practice effects. Table 20–4 shows the differences between initial test means and retest means for each of the experimental samples. The gross increases, all statistically significant, are a function of maturation and practice effects. The technique used for dividing the total increase in mean score into that portion due to effects of practice and that due to effects of maturation is described under "Procedure". Since the differences in results for boys and girls were not large, they were averaged and graphs were prepared showing the average effects of practice (Figure 20–2) and maturation (Figure 20–3) for the three experimental samples.

The graphs in Figure 20–2 were based on differences between the mean scores of the twelfth grade sample and the twelfth grade retest mean scores of the ninth, tenth, and eleventh grade samples. The graphs show that the average effects of practice (or exposure to the initial GATB testing) were very similar for the three experimental samples. Length of time between initial testing and retesting had little relationship to size of practice effect. Finger Dexterity and Manual Dexterity showed the largest and Verbal Aptitude and Numerical Aptitude showed the smallest increases in scores attributable to practice. These findings apply equally to the results for the ninth, tenth, and eleventh grade samples and, as inspection of Table 20–4 will indicate, equally to results for boys and girls.

The graphs in Figure 20–3 were based on differences between mean scores of the twelfth grade sample and the mean of the initial scores of the ninth, tenth, and eleventh grade samples. The pattern in Figure 20–3 (maturation) is quite different from that in Figure 20–2 (practice). Although the shapes of the profiles for the three experimental samples tend to be parallel in both figures, the profile levels vary quite noticeably in Figure 20–3, a reflection of cumulative effects of maturation processes from the ninth to the twelfth grade. Thus, maturation increases for all aptitudes were largest between the ninth and twelfth grades and smallest between the eleventh and twelfth grades, where the sizes of the increase due to maturation were quite small. Average maturation effects from the ninth to twelfth and from the tenth to twelfth grades were largest for Motor Coordination and smallest for Spatial Aptitude. As in the case of practice effects, inspection of Table 20–4 shows that the results relating to average effects of maturation were quite similar for boys and girls.

Stability of aptitudes and OAP's. Aptitude stability coefficients are shown in Table 20–5 and in Figure 20–4. These stability coefficients are the product-moment correlations between initial test scores in lower high school grades and retest scores in the twelfth grade. The following points should be noted:

1. The profiles of stability coefficients for the experimental samples are parallel. The

Table 20–3. Means and Standard Deviations of GATB Aptitudes for the Four Samples (See Table 20–1 for Number of Cases)

Aptitude	Grade 9 Sample				Grade 10 Sample				Grade 11 Sample				Grade 12 Sample	
	Gr. 9 Test		Gr. 12 Test		Gr. 10 Test		Gr. 12 Test		Gr. 11 Test		Gr. 12 Test			
	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.
G—Intelligence														
Boys	98.65	13.90	111.00	14.84	101.93	14.49	110.47	15.05	105.10	15.20	110.47	15.01	107.30	14.78
Girls	97.91	13.93	108.68	14.75	100.92	14.55	108.60	15.11	103.14	15.01	108.48	14.38	104.15	14.63
V—Verbal Aptitude														
Boys	93.20	11.97	102.79	14.49	96.60	12.83	102.12	14.21	98.70	13.57	101.59	14.22	100.19	14.01
Girls	95.55	12.16	105.94	14.95	100.03	13.47	105.91	14.85	102.93	14.11	105.86	14.80	103.38	14.67
N—Numerical Aptitude														
Boys	97.70	13.57	109.34	14.41	99.37	14.15	108.93	14.72	102.76	15.26	109.17	14.75	106.54	14.36
Girls	100.19	13.81	108.47	14.27	101.74	14.32	108.82	14.73	103.08	15.15	108.70	14.01	105.70	14.60
S—Spatial Aptitude														
Boys	103.99	17.15	114.52	19.05	107.70	17.68	115.00	18.98	109.91	17.95	115.80	18.83	109.52	18.85
Girls	99.15	16.15	109.52	17.30	101.35	16.44	109.15	17.24	103.09	16.98	109.95	17.18	102.34	16.64
P—Form Perception														
Boys	99.66	16.46	111.95	15.98	104.45	16.93	111.55	15.60	107.67	17.09	112.50	15.66	107.78	15.25
Girls	106.86	16.40	117.29	15.38	111.96	16.20	117.42	15.04	113.84	16.84	118.17	15.40	113.03	15.63
Q—Clerical Perception														
Boys	95.64	11.72	106.76	13.14	99.78	12.22	106.92	13.14	102.91	12.37	108.15	13.06	103.48	12.70
Girls	104.02	12.58	117.64	13.61	109.57	13.30	118.75	14.41	112.73	13.83	119.41	14.24	114.35	13.89
K—Motor Coordination														
Boys	93.37	16.65	110.61	17.05	98.69	16.41	110.76	16.80	102.91	17.29	111.68	17.39	104.73	17.02
Girls	101.41	15.43	119.22	15.59	107.10	15.55	120.63	16.10	112.68	15.79	121.48	16.54	114.15	15.64
F—Finger Dexterity														
Boys	90.10	18.35	107.65	19.28	93.01	18.54	107.09	18.73	96.48	18.59	109.17	18.55	98.37	18.91
Girls	96.86	18.02	116.15	19.33	100.89	18.18	115.53	18.61	103.82	19.10	117.44	19.25	105.74	18.38
M—Manual Dexterity														
Boys	97.09	19.33	120.02	21.00	100.38	19.53	119.48	20.61	104.68	19.57	119.33	20.54	107.12	19.89
Girls	97.62	19.06	118.80	20.54	101.33	20.00	118.81	20.24	105.13	19.91	118.49	20.98	106.74	19.68

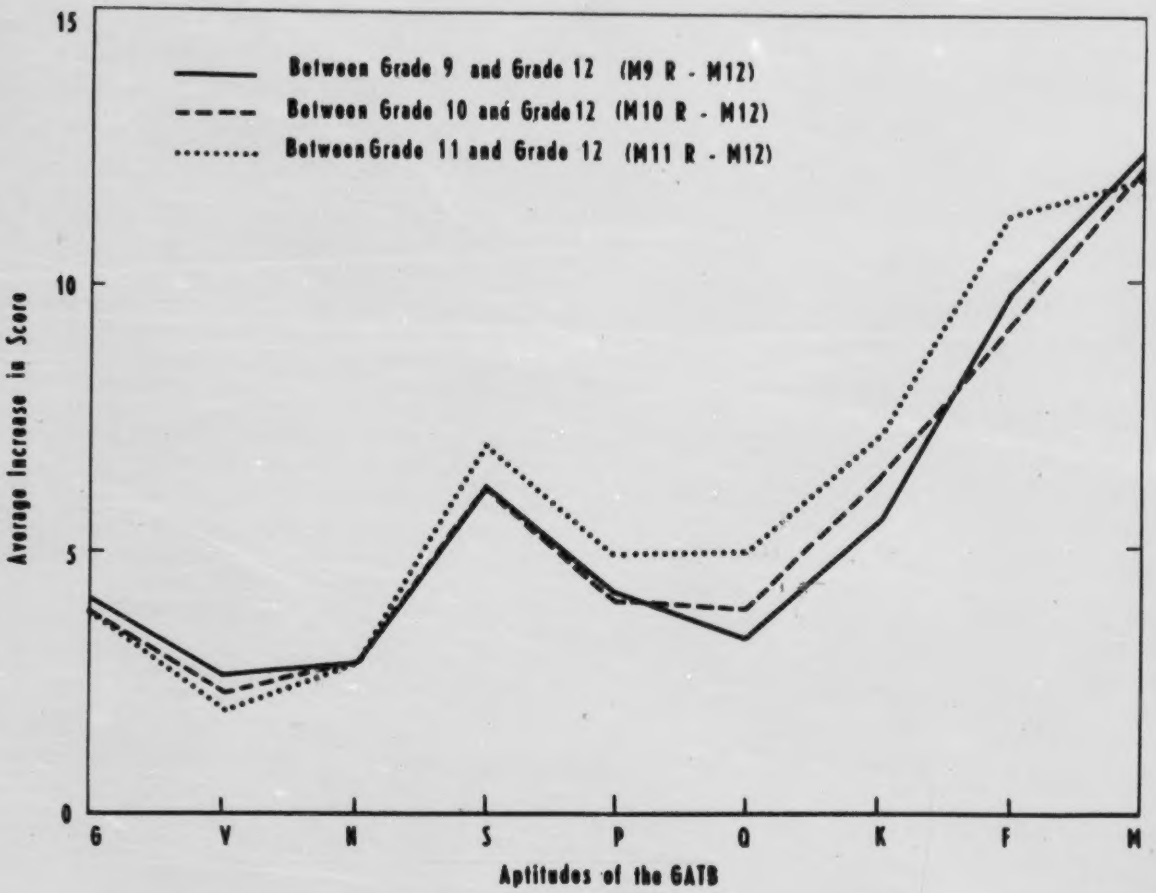

Fig. 20–2. Average increase in aptitude scores due to practice effects.

coefficients for all nine aptitudes were highest for the eleventh grade sample and lowest for the ninth grade sample. Medians and ranges of stability coefficients were as follows:

	Median	Range
Ninth grade sample	.69	.56—.80
Tenth grade sample	.72	.62—.83
Eleventh grade sample	.75	.64—.84

2. The aptitudes with the highest stability coefficients were Intelligence, Verbal Aptitude and Numerical Aptitude. The aptitudes with the lowest stability coefficients were Form Perception and Finger Dexterity. These findings were consistent, applying equally well to the results for the ninth, tenth and eleventh grade samples.

3. The boy-girl differences in stability coefficients were quite small, and the findings in 1 and 2 above, which were based on averaged stability coefficients, applied quite well to the data for boys and girls separately.

Twenty years of occupational research with the GATB have led to the development of validated Occupational Aptitude Pattern (OAP) norms for families of occupations requiring similar abilities. The OAP norms consist of cutting scores for three significant aptitudes required by the occupations in the family. To obtain information on stability of OAP's at the ninth, tenth and eleventh grade levels, OAP

Table 20–4. Mean Score Increases for the Aptitudes of the GATB (See Table 20–1 for Number of Cases)

Aptitude	Between Grades 9 and 12			Between Grades 10 and 12			Between Grades 11 and 12		
	Total ($M_{9R} - M_9$)	Practice ($M_{9R} - M_{12}$)	Maturation ($M_{12} - M_9$)	Total ($M_{10R} - M_{10}$)	Practice ($M_{10R} - M_{12}$)	Maturation ($M_{12} - M_{10}$)	Total ($M_{11R} - M_{11}$)	Practice ($M_{11R} - M_{12}$)	Maturation ($M_{12} - M_{11}$)
G—Intelligence									
Boys	12.3	3.7	8.6	8.6	3.2	5.4	5.4	3.2	2.2
Girls	10.7	4.5	6.2	7.6	4.4	3.2	5.3	4.3	1.0
Average	11.5	4.1	7.4	8.1	3.8	4.3	5.4	3.8	1.6
V—Verbal Aptitude									
Boys	8.6	2.6	6.0	5.5	1.9	3.6	2.8	1.4	1.4
Girls	10.4	2.6	7.8	5.9	2.5	3.4	2.8	2.4	.4
Average	10.0	2.6	7.4	5.7	2.3	3.4	2.9	1.9	1.0
N—Numerical Aptitude									
Boys	11.6	2.8	8.8	9.6	2.4	7.2	6.4	2.6	3.8
Girls	8.2	2.7	5.5	7.1	3.1	4.0	5.6	3.0	2.6
Average	10.0	2.8	7.2	8.4	2.8	5.6	6.0	2.8	3.2
S—Spatial Aptitude									
Boys	10.5	5.0	5.5	7.2	5.4	1.8	6.6	6.2	.4
Girls	10.4	7.2	3.2	7.8	6.8	1.0	8.4	7.6	.8
Average	10.4	6.0	4.4	7.6	6.2	1.4	7.5	6.9	.6
P—Form Perception									
Boys	12.3	4.2	8.1	7.1	3.8	3.3	4.8	4.7	.1
Girls	10.4	4.2	6.2	5.4	4.4	1.0	5.9	5.1	.8
Average	11.3	4.2	7.1	6.2	4.0	2.2	5.3	4.9	.4
Q—Clerical Perception									
Boys	11.0	3.2	7.8	7.1	3.4	3.7	5.2	4.6	.6
Girls	13.5	3.2	10.3	9.2	4.4	4.8	6.6	5.0	1.6
Average	12.2	3.2	9.0	8.1	3.9	4.2	5.9	4.8	1.1
K—Motor Coordination									
Boys	17.2	5.8	11.4	12.0	6.0	6.0	8.8	7.0	1.8
Girls	17.7	5.0	12.7	13.4	6.4	7.0	8.7	7.3	1.4
Average	17.4	5.4	12.0	12.7	6.2	6.5	8.7	7.1	1.6

F—Finger Dexterity									
Boys	17.4	9.2	8.2	14.1	8.7	5.4	12.6	10.8	1.8
Girls	19.2	10.4	8.8	14.6	9.8	4.8	13.6	11.7	1.9
Average	18.4	9.8	8.6	14.3	9.2	5.1	13.1	11.2	1.9
M—Manual Dexterity									
Boys	22.0	12.9	10.0	19.1	12.4	6.7	14.6	12.2	2.4
Girls	21.1	12.0	9.1	17.4	12.0	5.4	13.4	11.8	1.6
Average	22.0	12.4	9.6	18.2	12.2	6.0	14.0	12.0	2.0

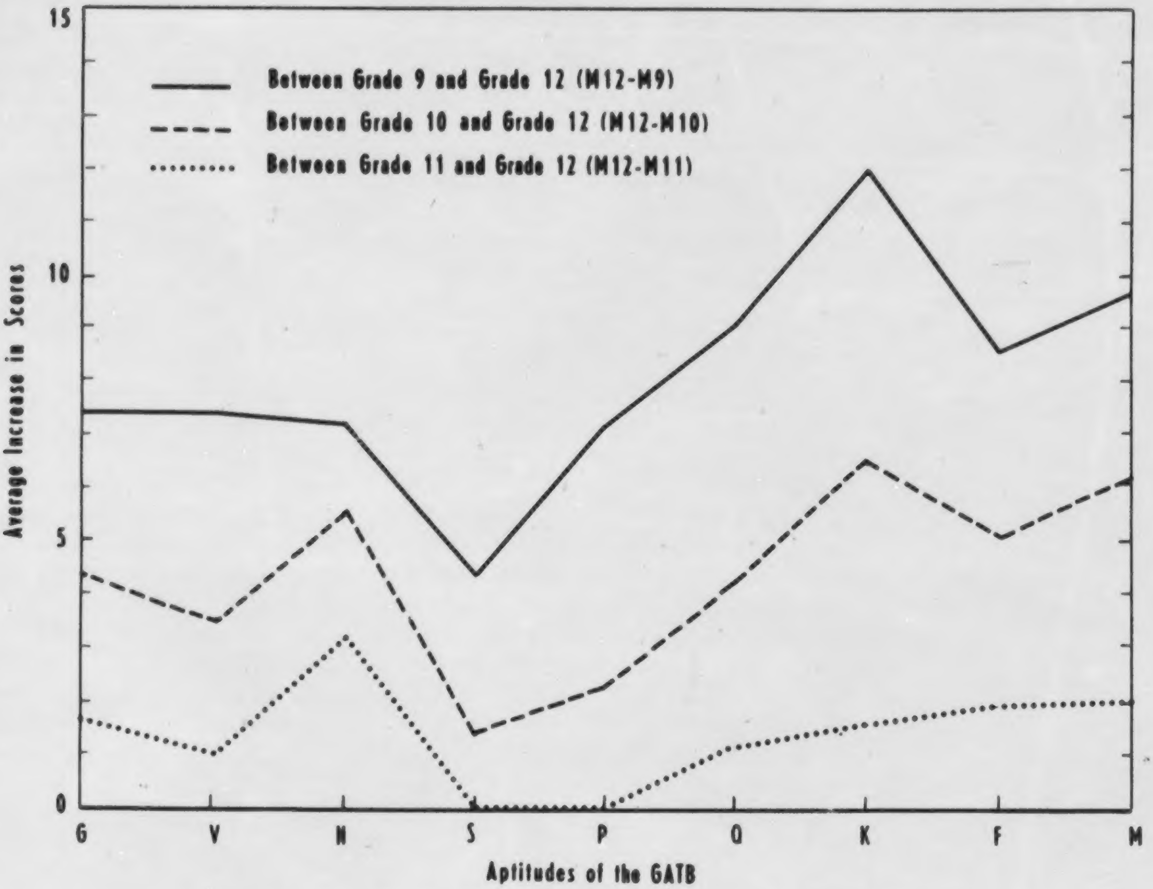

Fig. 20–3. Average increase in aptitude scores due to maturation.

norms (June 1966 edition of 36 OAP's) were applied to the initial and to the retest scores for each sample (after appropriate adjustments were made in the cutting scores for maturation and practice effects) and the relationships between pass-fail on initial test scores and pass-fail on retest scores were obtained. A summary of these results, in terms of the distribution of tetrachoric correlation coefficients between pass-fail on initial scores and pass-fail on retest scores, is shown in Table 20–6.

There was some variation in the distributions of tetrachoric correlations for boys and girls, but the medians were the same for the ninth and eleventh grade samples and only slightly different for the tenth grade sample. The distributions for boys and girls together are shown graphically in Figure 20–5. It is apparent that stability tended to be highest for the eleventh grade sample and lowest for the ninth grade sample.

The medians for the ninth, tenth and eleventh grade samples were .71, .75 and .77 respectively.

Effect of application of a cutting score band on OAP stability. A further inspection of the graphs in Figure 20–5 show the considerable variation in stability of OAP's for each sample. For some of the OAP's the stability is satisfactory even at a ninth grade level. On the other hand, other OAP's have unsatisfactory stability for use in counseling. This is particularly true at the ninth grade level where many of the OAP's have stability coefficients of less than .70. There is a serious question of whether OAP's with such low stability would be useful in counseling. Additional analyses of the data were made in an attempt to see whether it would be possible to improve OAP stability for a portion of the individuals. The objective of this analysis was to establish a "band" of cutting scores for each OAP which would identify individuals whose scores are close to the cutting scores for the OAP. These are the individuals for whom OAP instability is the greatest. The reason is that only slight changes in their test results are required for them to pass after failing initially, or to fail after passing initially. To the extent that establishing a score band is successful in identifying such individuals, it would be possible to increase stability when testing interpretation is limited to individuals who fall outside the band.

Table 20–5. Stability Coefficients for the Aptitudes of the GATB (See Table 20–1 for Number of Cases)

Aptitude	$r_{9\ 9R}$	$r_{10\ 10R}$	$r_{11\ 11R}$
G–Intelligence			
Boys	.78	.82	.84
Girls	.80	.83	.83
Average	.79	.82	.83
V–Verbal Aptitude			
Boys	.79	.82	.82
Girls	.79	.81	.82
Average	.79	.81	.82
N–Numerical Aptitude			
Boys	.78	.80	.83
Girls	.76	.78	.80
Average	.77	.79	.81
S–Spatial Aptitude			
Boys	.72	.76	.75
Girls	.69	.71	.72
Average	.70	.73	.74
P–Form Perception			
Boys	.63	.65	.67
Girls	.62	.65	.67
Average	.62	.65	.67
Q–Clerical Perception			
Boys	.66	.70	.73
Girls	.60	.66	.68
Average	.63	.68	.71
K–Motor Coordination			
Boys	.68	.72	.75
Girls	.72	.76	.82
Average	.70	.74	.79
F–Finger Dexterity			
Boys	.56	.62	.64
Girls	.58	.62	.67
Average	.57	.62	.65
M–Manual Dexterity			
Boys	.63	.68	.71
Girls	.65	.69	.74
Average	.64	.69	.73

The bands around OAP cutting scores were based on the standard errors of measurement for each aptitude as computed separately for the ninth, tenth, and eleventh grade samples. Thus, the width of the band around the cutting score for each aptitude in the norms for a particular OAP is one-half of the standard error of measurement on either side of the cutting score. This basis for the band width was chosen after some preliminary tryouts on small subsamples. The band widths are shown in Table 20–7.

The differences were not great for the three samples but, where differences exist, the ninth grade band widths were highest and the eleventh grade band widths were lowest. The aptitudes with the greatest band widths were Finger Dexterity and Manual Dexterity, the aptitudes with the lowest stability coefficients. Table 20–8 shows the results of the application of the band in the case of OAP 1 for ninth grade boys.

The three aptitudes in OAP 1 (June 1966 edition of OAP's) are Intelligence, Numerical Aptitude, and Spatial Aptitude. The four-way table for the total group shows that OAP 1 had relatively high stability. (The tetrachoric correlation for this table was .82). Another, and perhaps more meaningful, way of judging stability is on the basis of the proportion of incorrect predictions—individuals in the upper left and lower right cells of the four-way-table. For the total group this proportion was .12, in-

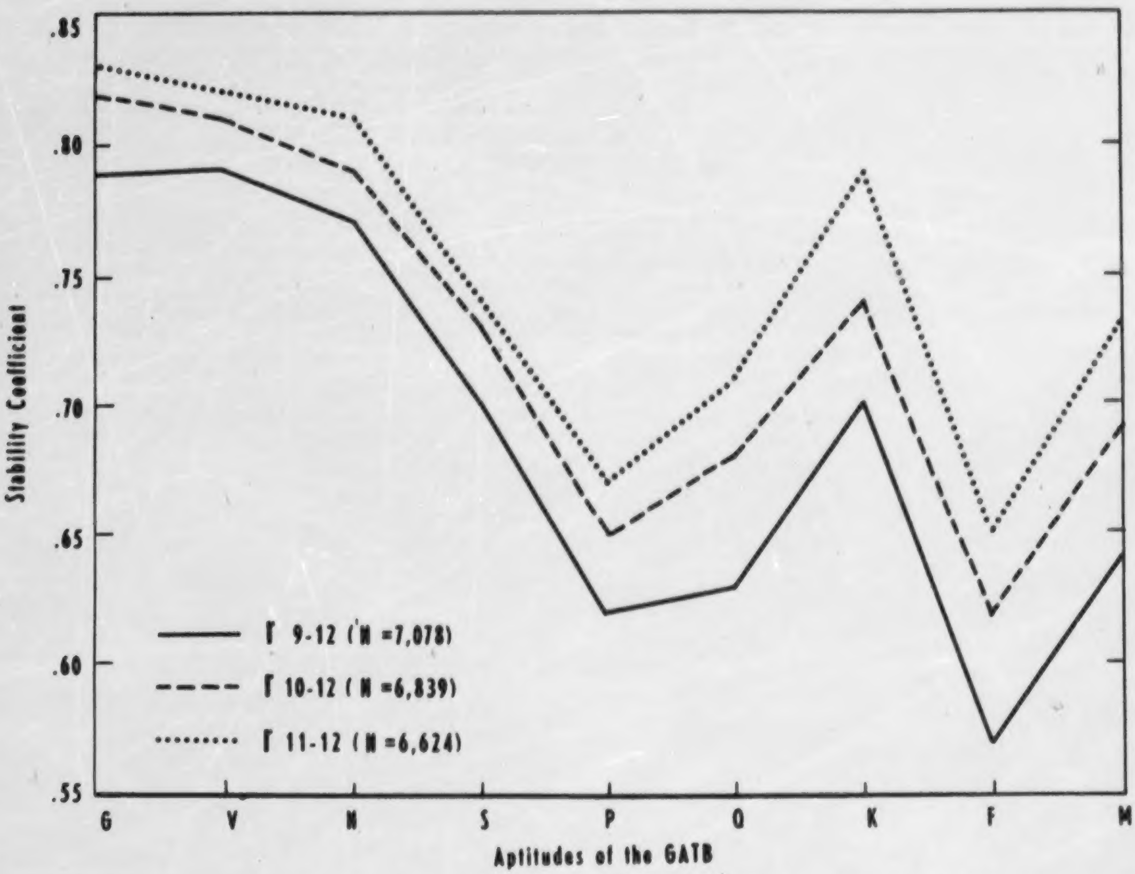

Fig. 20–4. Correlations between initial test scores in Grades 9, 10, and 11 and retest scores in Grade 12.

Table 20–6. Distribution of Tetrachoric Correlations Between Pass-Fail on Initial Score and Pass-Fail on Retest Score for the 36 OAP's

Interval	Grade 9 Sample			Grade 10 Sample			Grade 11 Sample		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
.90–.94	0	0	0	0	0	0	1	1	2
.85–.89	1	0	1	2	2	4	3	1	4
.80–.84	2	5	7	8	5	13	8	8	16
.75–.79	8	8	16	7	13	20	12	14	26
.70–.74	8	6	14	11	8	19	10	6	16
.65–.69	10	12	22	6	6	12	2	4	6
.60–.64	7	5	12	2	2	4	0	2	2
Mdn.	.71	.71	.71	.74	.76	.75	.77	.77	.77

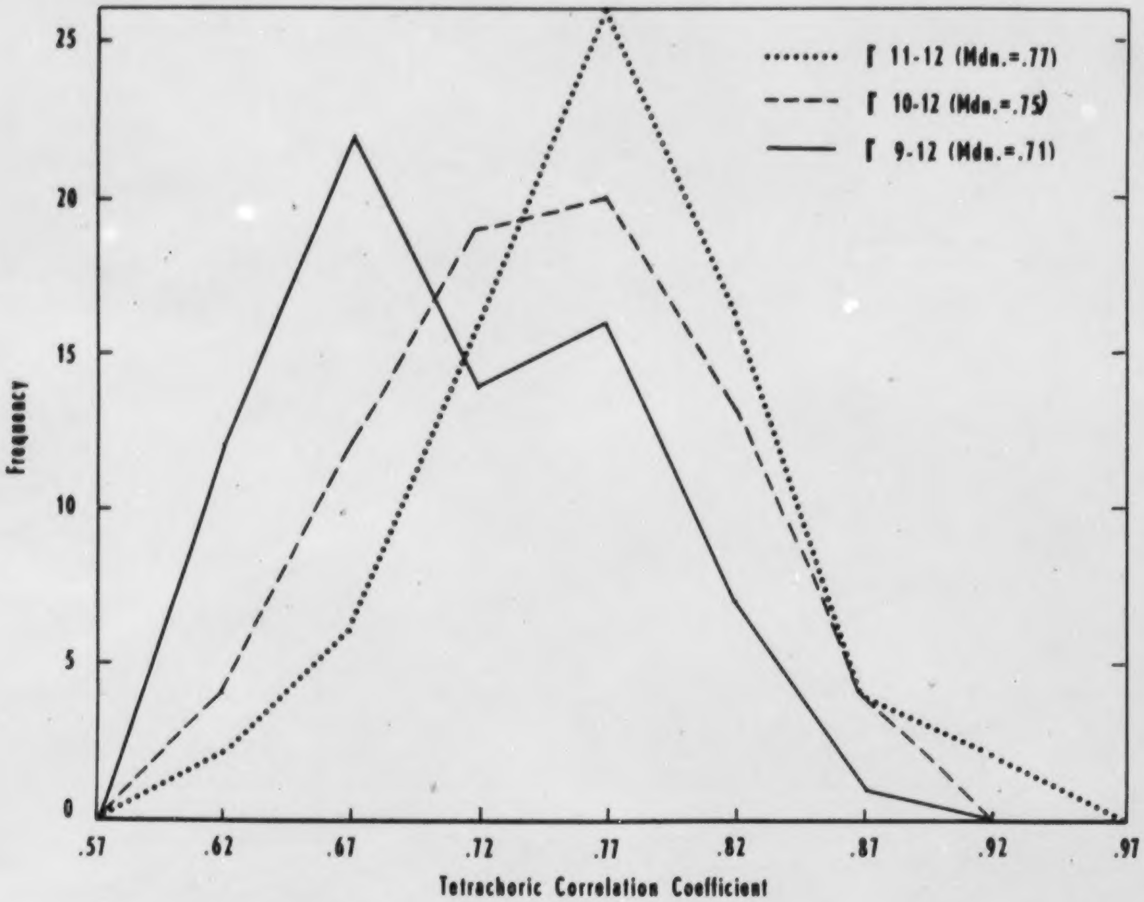

Fig. 20–5. Distributions of tetrachoric correlations between pass-fail on initial scores and pass-fail on retest scores for the 36 OAP's.

dicating that 12 percent of those tested initially change from a pass to fail status or from a fail to a pass status when retested as twelfth graders. The four-way table for the within-band group shows that, for this portion of the total group, the proportion misclassified was .21, considerably higher than the .07 proportion for the outside band four-way table shown next.

This means that stability of OAP 1 can be improved if the counselor restricts his interpretation on OAP 1 to the individuals whose initial scores are outside the band for this OAP.

Similar results were obtained with other OAP's. The medians and ranges of the proportions of incorrect predictions for the 36 OAP's were as follows for the total group and for the group outside the band:

	Range		Median	
	Total	Outside	Total	Outside
Ninth grade ..	.06—.43	.03—.39	.20	.14
Tenth grade ..	.06—.42	.03—.39	.19	.13
Eleventh grade	.05—.43	.03—.39	.18	.13

It should be noted that the band concept used in the data analysis described above differs in several respects from use of confidence bands on the GATB Indicator form which is described in detail in Chapter 22 of this Sec-

Table 20–7. Width (±) of Band Around OAP Cutting Scores

Aptitude	Grade 9	Grade 10	Grade 11
G–Intelligence	3	3	3
V–Verbal Aptitude	3	3	3
N–Numerical Aptitude	3	3	3
S–Spatial Aptitude	5	4	4
P–Form Perception	5	5	5
Q–Clerical Perception	4	4	4
K–Motor Coordination	5	4	4
F–Finger Dexterity	6	6	6
M–Manual Dexterity	6	6	5

tion. On the GATB Indicator the bands are placed around the individual's scores rather than the cutting scores, and the band width is one standard error of measurement on each side of the individual's scores. Also, the standard error of measurement used on the GATB Indicator is based on an adult sample retested at intervals of from one day to six months. Thus, while the GATB Indicator may be used with high school students for the purposes indicated in Chapter 22, the procedures described above are relevant for the specific purpose of predicting students' twelfth grade performance on OAP's.

Because of individual differences in rates of maturation, those tested in the ninth or tenth grade with the GATB should be retested after they reach the twelfth grade, at the stage where their vocational and educational potentials are becoming more crystallized.

Discussion. There are remarkably few inconsistencies and irregularities in the results. The similarities in practice effects for the three experimental samples are striking, and the major findings apply equally to boys and girls. We find the expected increases in mean scores attributable to maturation; there are no inconsistencies when results for the three experimental samples are compared; and the increases for boys and girls are quite similar. The profiles of stability coefficients are parallel, corresponding to parallel profiles of mean score increases. Again, the boy-girl differences are quite small. It is reasonable to conclude that in terms of average effects of maturation and practice on GATB aptitude scores of high school students, we have about as good information as we can get. The results provide a good basis for making adjustments in aptitude scores (or aptitude norms) for effects of maturation or practice.

But the problem of individual differences in rates of maturation or ability to benefit from practice remains. The results show clearly that these individual differences have an adverse effect on aptitude stability, with some individual aptitudes and some OAP's having stability coefficients that are too low to be considered useful in counseling in lower high school grades. Additional research may provide a basis for increasing aptitude stability through additional testing or combining aptitude measures at the lower high school grade levels. Use of the band principle makes increased stability of measurement possible for OAP's when the interpretation is restricted to individuals whose scores fall outside the band.

Derivation of revised ninth and tenth grade norms. Adult GATB norms for OAP's can be used without modification in counseling eleventh and twelfth graders, but the minimum scores are too high for use with students in the lower high school grades. To make the occupational norms useful for counseling ninth and tenth graders, the adult minimum scores must be converted to equivalent ninth and tenth grade minimum scores. The conversions were developed from standard score equations using the means and standard deviations of initial scores shown in Table 20–3. The form of the equation is $Y = aX + b$, where "Y" represents the cutting score for a lower high school grade that corresponds to the twelfth grade (adult) cutting score of "X". The values of "a" and "b" in the equations are shown in Table 20–9.

Application of these equations to the adult OAP cutting scores resulted in derivation of ninth and tenth grade cutting scores that were quite similar for boys and girls. Therefore, the cutting scores for boys and girls were averaged. They are shown in the form of tables of Grade 9 and Grade 10 "Minimum Aptitude

Table 20–8. Relationship Between Pass-Fail on Initial Score and Pass-Fail on Retest Scores for OAP–1 (Adult Norms G–125, N–115, S–115) for Grade 9 Boys

TOTAL GROUP

		Retest Scores			
		Fail	Pass	Total	
Initial Test Scores	Pass	74(b)	144(a)	218	$\frac{b+c}{N} = .12$
	Fail	2856(d)	324(c)	3180	
	Total	2930	468	3398	

WITHIN "BAND"

		Fail	Pass	Total	
Initial Test Scores	Pass	46	45	91	$\frac{b+c}{N} = .21$
	Fail	887	197	1084	
	Total	933	242	1175	

OUTSIDE "BAND"

		Fail	Pass	Total	
Initial Test Scores	Pass	28	99	127	$\frac{b+c}{N} = .07$
	Fail	1969	127	2096	
	Total	1997	226	2223	

TOTAL GROUP

		Fail	Pass	Total
Initial Test Scores	Pass	28 46	99 45	218
	Fail	887 1969	197 127	3180
	Total	2930	468	3398

Table 20–9. Values of "a" and "b" in the Equation Y = aX + b for Converting Adult Cutting Scores (X) to Corresponding Cutting Scores (Y) for Lower High School Grades

Aptitude	Grade 9				Grade 10			
	Boys		Girls		Boys		Girls	
	a	b	a	b	a	b	a	b
G–Intelligence	.940	−2.212	.952	−1.241	.980	−3.224	.995	−2.709
V–Verbal Aptitude	.854	7.638	.829	9.848	.916	4.826	.918	5.127
N–Numerical Aptitude	.945	−2.980	.946	.198	.985	−5.572	.981	−1.952
S–Spatial Aptitude	.910	4.327	.971	−.222	.938	4.970	.988	.238
P–Form Perception	1.079	−16.635	1.049	−11.708	1.110	−15.186	1.036	−5.139
Q–Clerical Perception	.923	.128	.906	.419	.962	.232	.958	.023
K–Motor Coordination	.978	−9.056	.987	−11.256	.964	−2.270	.994	−6.365
F–Finger Dexterity	.970	−5.319	.980	−6.765	.980	−3.393	.989	−3.687
M–Manual Dexterity	.972	−7.031	.968	−5.704	.982	−4.812	1.016	−7.118

Scores for Occupational Aptitude Patterns", in Section I of the GATB *Manual.* Tables 20–10 and 20–11 show the ninth and tenth grade cutting scores corresponding to adult cutting scores in the range 70–125. Tables like these appear in Section IV of the GATB *Manual* for use in adjusting SATB norms for use with ninth and tenth graders.

The 1966 ninth and tenth grade norms supersede the 1959 norms developed from a previous study (Droege, 1960). Table 20–12 shows the distribution of differences between

Table 20–10. Ninth Grade Cutting Scores Corresponding to Adult Cutting Scores in the Range 70–125

Adult Cutting Score	Aptitudes of the GATB								
	G	V	N	S	P	Q	K	F	M
125	117								
120									
115	107		107	110					
110	102		103						
105	98	97	98			96			
100	93	93	93	96	92	92			91
95	88		88	91	87	87			
90	83	84	83	87	82	83	78	82	81
85	79		79	82	76		73	77	76
80	74		74	77		73	68	72	71
75	69		70	73	66			67	66
70							59		

Note.—The cutting scores are those for the 1962 edition of the OAP's.

Table 20–11. Tenth Grade Cutting Scores Corresponding to Adult Cutting Scores in the Range 70–125

Adult Cutting Score	Aptitudes of the GATB								
	G	V	N	S	P	Q	K	F	M
125	120								
120									
115	111		109	113					
110	106		104						
105	101	101	100			101			
100	96	97	94	99	97	96			94
95	91		90	94	92	91			
90	86	88	85	89	86	86	84	85	84
85	81		80	84	81		79	80	79
80	76		75	80		77	74	75	74
75	71		70	75	70			70	69
70							64		

Note.—The cutting scores are those for the 1962 edition of the OAP's.

the cutting scores based on this study and those derived from the previous study. Most of the cutting scores from the two studies differ no more than one point; 88% differ no more than two points; and all are within four points.

Table 20–12. Distribution of Differences Between 1966 Cutting Scores Shown in Tables 20–10 and 20–11 and 1959 Cutting Scores from Previous Study

Differences	Frequency	
	Grade 9	Grade 10
+4	2	1
+3	0	7
+2	9	12
+1	17	9
0	12	9
−1	5	6
−2	5	7
−3	2	1

Note.—Positive differences indicate that 1966 cutting scores are higher.

Occupational Aptitudes of Dropouts

Not included in the analysis of aptitude maturation were those students initially tested in a lower high school grade who subsequently dropped out of school or transferred to another school. The purpose of this discussion is to compare the occupational aptitudes of dropouts and graduates in the same schools.

Table 20–13 shows the distribution of graduates and dropouts in the samples initially tested with the GATB, B–1002B in Grades 9, 10 and 11 during the period February 1–April 30, 1958. The term "dropout" refers to individuals tested in the grade indicated who dropped out of school before graduation. Students who transferred to other schools after being tested in a lower high school grade are not included in either the dropout or graduate groups.

Table 20–14 shows the mean and standard deviation of years of age at time of testing for the samples. Note that the dropout group is somewhat older and more variable in age than its graduate counterpart for each sample.

The aptitude means and standard deviations for graduates and dropouts are shown in Table 20–15.

Table 20–13. Number of Cases in the Samples

Sample	Graduates	Dropouts
Grade 9		
Boys	3,398	684
Girls	3,680	735
Grade 10		
Boys	3,348	524
Girls	3,491	551
Grade 11		
Boys	3,229	220
Girls	3,395	251

The mean scores are highest for the Grade 11 sample and lowest for the Grade 9 sample, an indication of the effects of maturation on aptitude scores.

Table 20–16 shows the differences in aptitude mean scores for graduates and dropouts. All differences except those for Aptitudes F and M for Grade 10 boys are significant at the .01 level, and graduates have the higher mean score in each instance. The cognitive aptitudes (G, V, and N) show the largest differences; the spatial-perceptual aptitudes (S, P and Q) show the next largest differences; and the dexterity aptitudes (K, F and M) show the smallest differences.

Table 20–14. Means and Standard Deviations of Years of Age for the Samples

Sample	Graduates		Dropouts	
	M	S.D.	M	S.D.
Grade 9				
Boys	14.9	.6	15.6	.8
Girls	14.8	.5	15.2	.7
Grade 10				
Boys	15.9	.6	16.4	.8
Girls	15.8	.5	16.1	.7
Grade 11				
Boys	16.9	.6	17.2	.9
Girls	16.8	.5	17.0	.7

Intercorrelations of GATB Aptitudes

The ninth, tenth, eleventh, and twelfth grade samples in the maturation study were comparable in the sense that they all included only "survivors" to the same point in the twelfth grade. The GATB aptitude intercorrelations of these samples are shown separately for boys and girls in Tables 20–17, 20–18, 20–19, and 20–20.

Tables 20–21, 20–22, and 20–23 show the difference between the intercorrelations of the twelfth grade sample and the intercorrelations of the ninth, tenth and eleventh grade samples, respectively. Table 20–24 shows the distributions of these differences.

The data in these tables show that the GATB intercorrelations of ninth, tenth and eleventh graders do not differ substantially from those of twelfth graders.

FOLLOW-UP STUDY ON HIGH SCHOOL PERFORMANCE

The purpose of this study was to determine the adequacy of GATB scores obtained at various grade levels in high school to predict academic success in high school. It provides a good basis for estimating the validity of each of the GATB aptitudes separately for boys and girls tested in the 9th, 10th or 11th grade of high school and retested in 12th grade for predicting performance in six high school course areas and overall academic standing.

Procedure

Figure 20–1 shown in the introduction to this Chapter outlines the data collection schedule for this study. The numbers given in the three boxes labelled "Retesting Seniors" indicate the sizes of the samples for which data were available. However, for reasons which will become apparent later, the data analysis was performed on about 30% of each sample for which data were available. The criteria used in this study were as follows:

(1) Academic Standing—the normalized rank-in-class scores of graduating seniors only, with both boys and girls included in the same rank order distribution.

(2) Grade point average for all courses

Table 20–15. ***Means and Standard Deviations of GATB Aptitudes for Graduates and Dropouts (See Table 20–13 for Number of Cases)***

Aptitude	Grade 9 Sample				Grade 10 Sample				Grade 11 Sample			
	Graduates		Dropouts		Graduates		Dropouts		Graduates		Dropouts	
	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.
G–Intelligence												
Boys	98.65	13.90	87.51	12.97	101.93	14.49	92.80	14.02	105.10	15.20	96.00	14.27
Girls	97.91	13.93	87.97	13.80	100.92	14.55	91.88	14.57	103.14	15.01	94.71	14.96
V–Verbal Aptitude												
Boys	93.20	11.97	84.86	10.06	96.60	12.83	89.28	11.16	98.70	13.57	92.38	11.83
Girls	95.55	12.16	87.76	10.20	100.03	13.47	91.28	11.52	102.93	14.11	96.55	13.01
N–Numerical Aptitude												
Boys	97.70	13.57	86.54	14.47	99.37	14.15	90.22	14.57	102.76	15.26	93.20	14.76
Girls	100.19	13.81	90.68	15.05	101.74	14.32	93.25	15.55	103.08	15.15	94.90	15.53
S–Spatial Aptitude												
Boys	103.99	17.15	97.32	17.36	107.70	17.68	101.61	17.44	109.91	17.95	104.36	17.86
Girls	99.15	16.15	92.93	15.81	101.35	16.44	96.62	17.05	103.09	16.98	97.20	17.85
P–Form Perception												
Boys	99.66	16.46	94.19	17.03	104.45	16.93	98.37	16.43	107.67	17.09	100.13	18.87
Girls	106.86	16.40	100.89	16.73	111.96	16.20	106.82	16.88	113.84	16.84	109.60	16.70
Q–Clerical Perception												
Boys	95.64	11.72	89.79	11.11	99.78	12.22	93.21	11.22	102.91	12.37	96.70	13.54
Girls	104.02	12.58	97.82	12.53	109.57	13.30	103.06	12.92	112.73	13.83	106.88	13.67
K–Motor Coordination												
Boys	93.37	16.65	89.86	18.90	98.69	16.41	94.54	18.65	102.91	17.29	97.13	18.79
Girls	101.41	15.43	98.04	17.05	107.10	15.53	103.60	16.02	112.68	15.79	107.78	16.21
F–Finger Dexterity												
Boys	90.10	18.35	86.96	20.17	93.01	18.54	91.44	19.36	96.48	18.59	90.80	19.68
Girls	96.86	18.02	93.23	19.05	100.89	18.18	97.78	19.93	103.82	19.10	100.01	20.29
M–Manual Dexterity												
Boys	97.09	19.33	93.11	20.18	100.38	19.53	98.77	20.14	104.68	19.57	99.55	19.19
Girls	97.62	19.06	93.91	20.02	101.33	20.00	97.00	20.81	105.13	19.91	97.50	20.36

Table 20–16. Mean Score Differences (Graduates-Dropouts) for the Aptitudes of the GATB

Aptitude	Grade 9 Sample	Grade 10 Sample	Grade 11 Sample
G–Intelligence			
Boys	11.14	9.13	9.10
Girls	9.94	9.04	8.43
V–Verbal Aptitude			
Boys	8.34	7.32	6.32
Girls	7.79	8.75	6.38
N–Numerical Aptitude			
Boys	11.16	9.15	9.56
Girls	9.51	8.49	8.18
S–Spatial Aptitude			
Boys	6.67	6.09	5.55
Girls	6.22	4.73	5.89
P–Form Perception			
Boys	5.47	6.08	7.54
Girls	5.97	5.14	4.24
Q–Clerical Perception			
Boys	5.85	6.57	6.21
Girls	6.20	6.51	5.85
K–Motor Coordination			
Boys	3.51	4.15	5.78
Girls	3.37	3.50	4.90
F–Finger Dexterity			
Boys	3.14	1.57	5.68
Girls	3.63	3.11	3.81
M–Manual Dexterity			
Boys	3.98	1.61	5.13
Girls	3.71	4.33	7.63

taken in the subject areas specified below for all students initially tested in a lower grade and retested as seniors:

(a) Biological and Physical Sciences
(b) Commercial Courses
(c) English
(d) Foreign Languages
(e) Mathematics
(f) Social Studies

Since the standards for assigning grades and the levels of achievement necessary to secure high class standing vary widely between high schools, validity coefficients were computed separately for each school in the study. Within schools, separate validity coefficients were computed for boys and for girls at each grade level to determine whether sex and grade differences in validity exist. Altogether, several thousand validity coefficients were computed on the basis of data from over 20,000 individuals.

Although the computation of sets of validities had to be done separately for each school, further analyses were required to permit meaningful comparisons and generalizations. These analyses were based on the data from the 14 schools with at least 30 cases in each grade, sex, criterion (except Foreign Language and Commercial) combination. Since sufficient cases were not available in some of the 14 schools for stable validities for Foreign Language and Commercial criteria, separate analyses were done for these course areas. Eight of the 14 schools enter into the analysis of the validity of GATB aptitudes for predicting Foreign Language grades and six of the 14 schools enter into the corresponding analysis for predicting commercial course grades for boys only.

Samples

The sizes of the samples on which validity coefficients were obtained are summarized in Tables 20–25, 20–26, and 20–27. The sample sizes are tabulated by criterion separately for boys and girls. For each grade the number of girls in each criterion group was typically larger than the number of boys.

The maximum number of cases for both boys and girls in all but one school was found in the English course grade criterion groups shown in Table 20–28. The smallest number of boys in each school was usually found in the Commercial course criterion group of boys and girls and the Foreign Language course criterion group of girls.

Results

The data were analyzed to determine the relationship between the aptitude scores and criterion measures of students initially tested in

Table 20–17. Intercorrelations of the GATB Aptitudes–Grade 9: Boys, N= 3398 (upper right); Girls, N=3680 (lower left)

Aptitude	G	V	N	S	P	Q	K	F	M
G–Intelligence		.77	.80	.63	.45	.52	.22	.23	.22
V–Verbal Aptitude	.77		.55	.35	.29	.44	.19	.15	.14
N–Numerical Aptitude	.81	.54		.29	.42	.57	.27	.19	.25
S–Spatial Aptitude	.66	.38	.36		.44	.28	.08	.27	.17
P–Form Perception	.46	.30	.45	.43		.57	.33	.34	.34
Q–Clerical Perception	.49	.42	.56	.29	.57		.35	.24	.30
K–Motor Coordination	.24	.21	.30	.08	.36	.36		.26	.45
F–Finger Dexterity	.26	.17	.25	.26	.34	.28	.30		.50
M–Manual Dexterity	.23	.16	.27	.16	.37	.32	.48	.52	

Table 20–18. Intercorrelations of the GATB Aptitudes–Grade 10: Boys, N=3348 (upper right); Girls, N=3491 (lower left)

Aptitude	G	V	N	S	P	Q	K	F	M
G–Intelligence		.77	.78	.64	.45	.52	.22	.25	.18
V–Verbal Aptitude	.77		.52	.36	.29	.44	.20	.15	.11
N–Numerical Aptitude	.79	.51		.28	.41	.58	.27	.19	.20
S–Spatial Aptitude	.66	.38	.33		.45	.27	.06	.30	.17
P–Form Perception	.45	.30	.44	.41		.57	.33	.34	.33
Q–Clerical Perception	.48	.39	.53	.27	.58		.35	.24	.26
K–Motor Coordination	.23	.22	.30	.06	.34	.37		.25	.41
F–Finger Dexterity	.23	.15	.21	.22	.33	.25	.30		.51
M–Manual Dexterity	.19	.10	.26	.12	.34	.28	.46	.48	

Table 20–19. Intercorrelations of the GATB Aptitudes—Grade 11: Boys, N=3229 (upper right); Girls, N=3395 (lower left)

Aptitude	G	V	N	S	P	Q	K	F	M
G–Intelligence		.79	.80	.64	.43	.49	.21	.19	.12
V–Verbal Aptitude	.77		.55	.35	.25	.42	.19	.09	.02
N–Numerical Aptitude	.79	.52		.30	.41	.55	.30	.15	.16
S–Spatial Aptitude	.66	.36	.32		.42	.26	.05	.25	.14
P–Form Perception	.42	.27	.37	.44		.54	.33	.27	.28
Q–Clerical Perception	.46	.37	.52	.27	.53		.35	.19	.20
K–Motor Coordination	.22	.21	.25	.09	.32	.33		.20	.36
F–Finger Dexterity	.23	.15	.19	.27	.33	.25	.28		.44
M–Manual Dexterity	.19	.11	.21	.17	.32	.27	.46	.50	

Table 20–20. Intercorrelations of the GATB Aptitudes—Grade 12: Boys, N=3028 (upper right); Girls, N=3139 (lower left)

Aptitude	G	V	N	S	P	Q	K	F	M
G–Intelligence		.81	.78	.68	.50	.52	.23	.23	.18
V–Verbal Aptitude	.80		.56	.37	.34	.46	.21	.13	.07
N–Numerical Aptitude	.80	.56		.30	.43	.57	.27	.19	.20
S–Spatial Aptitude	.67	.36	.36		.49	.27	.10	.26	.18
P–Form Perception	.47	.33	.43	.45		.55	.35	.30	.31
Q–Clerical Perception	.47	.41	.52	.27	.54		.38	.18	.23
K–Motor Coordination	.22	.21	.28	.07	.30	.35		.26	.42
F–Finger Dexterity	.26	.16	.25	.23	.31	.29	.29		.50
M–Manual Dexterity	.17	.09	.21	.12	.30	.27	.42	.46	

Table 20–21. Differences Between Grade 12 and Grade 9 GATB Intercorrelations; Boys (Upper right); Girls (Lower left)

Aptitude	G	V	N	S	P	Q	K	F	M
G–Intelligence		.04	−.03	.05	.06	−.01	.01	.01	−.04
V–Verbal Aptitude	.03		.01	.01	.05	.02	.02	−.02	−.07
N–Numerical Aptitude	−.01	.02		.01	.02	.00	.00	.00	−.05
S–Spatial Aptitude	.01	−.02	.00		.05	−.01	.02	−.01	.01
P–Form Perception	.01	.03	−.02	.02		−.02	.02	−.04	−.03
Q–Clerical Perception	−.03	−.01	−.04	−.02	−.03		.04	−.06	−.08
K–Motor Coordination	−.02	.00	−.02	−.01	−.06	.00		−.01	−.03
F–Finger Dexterity	.00	−.02	.00	−.03	−.04	.01	−.01		.01
M–Manual Dexterity	−.07	−.07	−.06	−.04	−.06	−.05	−.06	−.06	

Note.—Negative sign indicates that Grade 9 correlation is higher.

Table 20–22. Differences Between Grade 12 and Grade 10 GATB Intercorrelations; Boys (Upper right); Girls (Lower left)

Aptitude	G	V	N	S	P	Q	K	F	M
G–Intelligence		.04	−.01	.04	.05	−.01	.01	−.02	−.01
V–Verbal Aptitude	.03		.04	.00	.05	.02	.01	−.03	−.04
N–Numerical Aptitude	.00	.05		.02	.02	−.01	.00	.00	.00
S–Spatial Aptitude	.01	−.02	.03		.04	.00	.04	−.04	.02
P–Form Perception	.02	.03	−.01	.03		−.02	.02	−.04	.02
Q–Clerical Perception	−.02	.02	−.02	.00	−.04		.03	−.06	−.04
K–Motor Coordination	−.02	−.01	−.02	.01	−.04	−.01		.00	.00
F–Finger Dexterity	.03	.00	.04	.00	−.02	.04	−.01		.00
M–Manual Dexterity	−.03	−.01	−.04	.00	−.03	−.01	−.04	−.02	

Note.—Negative sign indicates that Grade 10 correlation is higher.

Table 20–23. *Differences Between Grade 12 and Grade 11 GATB Intercorrelations; Boys (Upper right); Girls (Lower left)*

Aptitude	G	V	N	S	P	Q	K	F	M
G–Intelligence		.02	−.02	.04	.07	.02	.01	.05	.06
V–Verbal Aptitude	.03		.01	.02	.09	.04	.02	.04	.05
N–Numerical Aptitude	.01	.05		.00	.02	.02	−.02	.04	.03
S–Spatial Aptitude	.01	.00	.04		.06	.01	.04	.01	.04
P–Form Perception	.05	.06	.06	.01		.01	.02	.02	.03
Q–Clerical Perception	.00	.04	.00	.00	.01		.03	−.01	.03
K–Motor Coordination	.00	.00	.04	−.02	−.02	.02		.05	.05
F–Finger Dexterity	.02	.00	.06	−.04	−.02	.04	.00		.07
M–Manual Dexterity	−.02	−.02	.00	−.04	−.02	.00	−.04	−.04	

Note.—Negative sign indicates that Grade 11 correlation is higher.

Table 20–24. *Distributions of Differences Between Grade 12 and Grades 9, 10 and 11 GATB Intercorrelations*

Diff. in r's	Boys			Girls			Totals			Grand Total
	12–9	12–10	12–11	12–9	12–10	12–11	12–9	12–10	12–11	
.09			1						1	1
.08			0						0	
.07			2						2	2
.06	1		2			3	1		5	6
.05	3	2	4		1	2	3	3	6	12
.04	2	5	6		2	4	2	7	10	20
.03	0	1	4	2	5	1	1	5	5	13
.02	5	6	8	2	2	2	7	8	10	25
.01	6	2	5	3	2	4	9	4	9	22
.00	4	8	1	5	5	10	9	13	11	33
−.01	4	4	1	4	6	0	8	10	1	18
−.02	2	2	2	6	7	6	8	9	8	25
−.03	3	1		3	2	0	6	3	0	9
−.04	2	4		3	4	4	5	8	4	17
−.05	1	0		1			2	0		2
−.06	1	1		5			6	1		7
−.07	1			2			3			3
−.08	1						1			1
Mdn.	.00	.00	.03	−.02	−.01	.00	−.01	.00	.02	.00

Note.—Negative sign indicates Grade 12 correlation is lower.

the 9th, 10th or 11th grade and retested in the 12th grade and to determine the differences in validity between boys and girls and between the initial test and the retest scores. For each grade, sex, criterion combination, there was considerable variation among the 14 schools in size of validity coefficient. Typically, the difference between the highest and lowest validity coefficient was about .45. Tables 20–29 through 20–34 show the median initial and retest validity coefficients separately for boys and girls at each grade level. The results confirm previous findings by Ingersoll and Peters (1966) that General Learning Ability (G), with validity coefficients in the .50's and .60's, correlates most highly with overall high school success of all the GATB aptitudes. In the present study, General Learning Ability was also the best predictor of Science course grades for both sexes and Mathematics course grades for boys, when both initial and retest validity for each grade are considered. In addition, General Learning Ability was the second best predictor of English and Social Studies course grades for both sexes and of Commercial course grades for girls. Verbal Aptitude (V) was, in most samples, the best predictor of English and Social Studies grades and the second best predictor of Academic Standing and Science grades. Aptitude V had correlations in the .50's and .60's for these criteria. Numerical Aptitude (N), with correlations in the .50's, was the best predictor of Mathematics grades and Commercial course grades for girls. As in the Ingersoll and Peters study, Clerical Perception (Q), with correlations primarily in the .30's and .40's, was also found to be a fair predictor of high school performance in all course areas. Jacobson (1965), in a study of 9th and 12th grade students in the Salt Lake City area, found Numerical Aptitude (N) to be the best single predictor of overall academic success and of Mathematics and Social Studies grades. He placed the GATB aptitudes in the following order of importance in overall academic prediction: N, G, V, Q, K, and P. The present

Table 20–25. Distributions of Sample Sizes of High School Students Initially Tested with the GATB in Grade 9 and Retested in Grade 12 Arranged by Criterion and Sex

Sample Size	Academic Standing		Science		Commercial		English		Foreign Language		Mathematics		Social Studies		Total	
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
140–149		1		1				1				1		1	0	5
130–139						1									0	1
120–129	1	1	1	1			2	1			2	1	2	1	8	5
110–119	1		1			1									2	1
100–109										1					0	1
90–99		2		1				2						2	0	7
80–89	1	1	1	1	1	1	2	1	2	1	1	2	2	1	10	8
70–79	1	3		3	1	3		3		1		2		3	2	18
60–69	2	1	4	1		2	3	1	1		4	1	3	1	17	7
50–59	5	1	4	2			4	2		1	4	4	4	2	21	12
40–49		4		4	2	6		3	3	4		3		3	5	27
30–39	3		3		2		3		2		3		3		19	0
Total	14	14	14	14	6	14	14	14	8	8	14	14	14	14	84	92
Median	59	73	59	69	45	65	59	73	47	49	59	59	59	73	58	69

Table 20–26. *Distributions of Sample Sizes of High School Students Initially Tested with the GATB in Grade 10 and Retested in Grade 12 Arranged by Criterion and Sex*

Sample Size	Academic Standing		Science		Commercial		English		Foreign Language		Mathematics		Social Studies		Total	
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
140–149				1				1				1		1	0	4
130–139		1	1			1	1				1		1		4	2
120–129	1			1				1						1	1	3
110–119		1				1						1			0	3
100–109	1		1				1			1	1		1		5	1
90–99		1		1				2	1	1				2	1	7
80–89	2	3	2	1	1	1	2	2	1		2	3	2	2	12	12
70–79	2	2	1			2	2	2		1	2	1	2	2	9	10
60–69	1	3	3	6	2	3	2	3			1	4	2	3	11	22
50–59	3	3	2	4		3	2	3	1	4	3	3	2	3	13	23
40–49	2		2		1	3	2		3	1	2	1	2		14	5
30–39	2		2		2		2		2		2		2		14	0
Total	14	14	14	14	6	14	14	14	8	8	14	14	14	14	84	92
Median	59	75	63	65	49	63	65	75	47	48	59	68	65	75	61	68

Table 20–27. *Distributions of Sample Sizes of High School Students Initially Tested with the GATB in Grade 11 and Retested in Grade 12 Arranged by Criterion and Sex*

Sample Size	Academic Standing		Science		Commercial		English		Foreign Language		Mathematics		Social Studies		Total	
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
140–149															0	0
130–139															0	0
120–129			1				1				1		1		4	0
110–119	1	1		1				1				1		1	1	5
100–109						1									0	1
90–99		1				1		2						2	0	6
80–89		3	1	3	1	2	1	2			1	4	1	2	5	16
70–79	2		1	1		1	1		1	1	1		1		7	3
60–69	2	4	2	3			2	4	2	1	1	2	2	4	11	18
50–59	5	3	5	3	1	4	6	3		3	7	3	6	3	30	22
40–49	3	2	3	3	2	4	2	2	2	2	2	3	2	2	16	18
30–39	1		1		2	1	1		3	1	1	1	1		10	3
Total	14	14	14	14	6	14	14	14	8	8	14	14	14	14	84	92
Median	56	65	56	63	45	65	57	65	45	53	56	59	57	65	55	62

study does not support the pre-eminent position of Numerical Aptitude nor does it support the position of K among the top six GATB aptitudes for predicting high school performance.

The median validity coefficients of the GATB aptitudes for predicting Foreign Language grades are shown in Table 20-35. It should be noted that these results are not directly comparable with the results reported above because the samples were drawn from fewer schools. These results are not highly consistent from sample to sample. Aptitudes G, V, and N, with correlations generally in the .40's, appear to offer the best prediction of this criterion. Aptitude Q was found to be a fair predictor of Foreign Language Grades.

The median validity coefficients of the GATB aptitudes for predicting Commercial course grades for boys are shown in Table 20-36. These results, again, are not directly comparable with the results reported for the other criterion groups, including the results for girls in the Commercial course criterion group. However, the pattern of predictive GATB aptitudes for boys was very similar to that for girls in the Commercial course criterion groups.

Sex differences in the validity of the GATB aptitudes are summarized in Table 20-37 for five criteria of high school performance.

For the criteria of overall Academic Standing, English and Social Studies, the GATB ap-

Table 20-28. Number of Cases in English Course Grade Criterion Group in Each School by Grade Level and Sex

School	State	9th		10th		11th	
		B	G	B	G	B	G
1	California	120	145	139	144	127	112
2	California	126	123	108	120	82	88
3	Connecticut	57	89	67	87	56	85
4	Connecticut	53	56	36	54	37	44
5	Connecticut	61	96	60	92	57	69
6	Michigan	83	78	76	84	55	56
7	New Jersey	56	69	83	90	72	98
8	New Jersey	62	74	43	70	63	57
9	New York	38	50	54	66	55	62
10	North Dakota	53	48	49	61	54	62
11	Pennsylvania	33	44	37	54	41	47
12	South Carolina	38	43	58	56	49	51
13	Tennessee	85	90	77	75	65	91
14	Wisconsin	62	73	82	67	56	61

Table 20-29. Median Validity Coefficients for Grade 9 and Grade 12 Scores on the Aptitudes of the GATB for 14 Samples of High School Boys Tested Initially in Grade 9 and Retested in Grade 12

Criterion	Grade in which tested	Median Validity Coefficient by Aptitude								
		G	V	N	S	P	Q	K	F	M
Academic Standing	Grade 9	.61	.56	.55	.24	.24	.39	.19	.11	.09
	Grade 12	.64	.64	.58	.25	.25	.45	.21	.11	.02
Science	Grade 9	.59	.54	.44	.36	.20	.33	.15	.12	.09
	Grade 12	.59	.54	.45	.29	.23	.35	.15	.12	.02
English	Grade 9	.55	.64	.56	.19	.23	.41	.17	.04	.07
	Grade 12	.58	.66	.55	.15	.18	.43	.22	.05	−.01
Mathematics	Grade 9	.59	.33	.55	.30	.23	.34	.07	.17	.11
	Grade 12	.52	.41	.54	.30	.22	.30	.12	.14	.06
Social Studies	Grade 9	.57	.59	.52	.18	.19	.42	.19	.04	.07
	Grade 12	.60	.63	.58	.18	.19	.44	.28	.06	−.02

titudes were generally somewhat more valid for girls. For the criteria of Science, the GATB aptitudes appear slightly more valid for boys. No consistent pattern of sex differences in validity for the Mathematics criteria was apparent.

A summary of the four GATB aptitudes most predictive of each criterion in order of size of validity coefficients is shown in Table 20–38.

It should be noted that the same four GATB aptitudes consistently offer the best prediction

Table 20–30. Median Validity Coefficients for Grade 9 and Grade 12 Scores on the Aptitudes of the GATB for 14 Samples of High School Girls Tested Initially in Grade 9 and Retested in Grade 12

Criterion	Grade in which tested	Median Validity Coefficient by Aptitude								
		G	V	N	S	P	Q	K	F	M
Academic Standing	Grade 9	.70	.62	.64	.30	.25	.41	.18	.21	.16
	Grade 12	.69	.66	.61	.29	.28	.36	.18	.08	.10
Science	Grade 9	.55	.51	.48	.28	.20	.34	.12	.15	.13
	Grade 12	.54	.55	.53	.24	.22	.31	.10	.09	.07
Commercial	Grade 9	.53	.45	.53	.19	.21	.36	.17	.18	.16
	Grade 12	.53	.53	.59	.17	.29	.43	.27	.08	.14
English	Grade 9	.62	.61	.57	.24	.21	.40	.22	.13	.12
	Grade 12	.64	.64	.61	.24	.24	.37	.19	.07	.06
Mathematics	Grade 9	.54	.43	.50	.26	.21	.32	.13	.13	.10
	Grade 12	.59	.49	.59	.32	.24	.31	.14	.15	.08
Social Studies	Grade 9	.64	.62	.53	.25	.20	.40	.15	.15	.10
	Grade 12	.64	.67	.54	.25	.20	.35	.12	.08	.07

Table 20–31. Median Validity Coefficients for Grade 10 and Grade 12 Scores on the Aptitudes of the GATB for 14 Samples of High School Boys Tested Initially in Grade 10 and Retested in Grade 12

Criterion	Grade in which tested	Median Validity Coefficient by Aptitude								
		G	V	N	S	P	Q	K	F	M
Academic Standing	Grade 10	.60	.60	.54	.23	.28	.48	.19	.10	.12
	Grade 12	.68	.66	.60	.24	.31	.39	.24	.11	.08
Science	Grade 10	.56	.57	.44	.31	.21	.36	.17	.10	.08
	Grade 12	.60	.61	.49	.32	.22	.28	.15	.12	.09
English	Grade 10	.60	.64	.52	.20	.26	.46	.14	.09	.03
	Grade 12	.65	.69	.59	.18	.27	.45	.24	.05	.07
Mathematics	Grade 10	.58	.48	.54	.27	.24	.36	.11	.11	.08
	Grade 12	.61	.51	.55	.30	.27	.36	.11	.12	.08
Social Studies	Grade 10	.58	.57	.47	.16	.14	.44	.15	.05	.02
	Grade 12	.58	.65	.48	.18	.14	.40	.21	.01	.06

although their order of importance varies from one criterion to the next. Of the remaining GATB aptitudes, Spatial Aptitude (S), Form Perception (P) and Motor Coordination (K) are predictive of the high school performance criteria used in this study to some extent, while the GATB dexterity tests, F and M, appear to have little or no validity for these criteria. The latter aptitudes would be more likely to predict a criterion of Industrial Arts or Shop course grades.

The validity coefficients obtained for the

Table 20–32. Median Validity Coefficients for Grade 10 and Grade 12 Scores on the Aptitudes of the GATB for 14 Samples of High School Girls Tested Initially in Grade 10 and Retested in Grade 12

Criterion	Grade in which tested	Median Validity Coefficient by Aptitude								
		G	V	N	S	P	Q	K	F	M
Academic Standing	Grade 10	.62	.61	.52	.32	.28	.39	.19	.19	.14
	Grade 12	.67	.59	.59	.31	.30	.40	.18	.15	.12
Science	Grade 10	.53	.54	.46	.29	.22	.31	.15	.11	.07
	Grade 12	.58	.53	.47	.31	.26	.27	.14	.13	.09
Commercial	Grade 10	.55	.47	.50	.25	.26	.37	.28	.20	.19
	Grade 12	.54	.49	.53	.25	.31	.39	.31	.18	.19
English	Grade 10	.62	.65	.51	.28	.27	.37	.22	.14	.09
	Grade 12	.69	.64	.57	.27	.29	.35	.18	.10	.10
Mathematics	Grade 10	.55	.44	.54	.29	.22	.34	.05	.08	.13
	Grade 12	.56	.40	.57	.32	.31	.36	.09	.10	.08
Social Studies	Grade 10	.61	.61	.48	.25	.24	.34	.22	.14	.08
	Grade 12	.64	.61	.52	.28	.25	.32	.17	.11	.10

Table 20–33. Median Validity Coefficients for Grade 11 and Grade 12 Scores on the Aptitudes of the GATB for 14 Samples of High School Boys Tested Initially in Grade 11 and Retested in Grade 12

Criterion	Grade in which tested	Median Validity Coefficient by Aptitude								
		G	V	N	S	P	Q	K	F	M
Academic Standing	Grade 11	.66	.62	.60	.19	.15	.40	.26	.11	.06
	Grade 12	.60	.58	.57	.23	.21	.42	.16	.13	.06
Science	Grade 11	.59	.55	.50	.26	.19	.34	.22	.13	.10
	Grade 12	.57	.54	.52	.27	.25	.38	.26	.14	.11
English	Grade 11	.61	.63	.58	.19	.17	.40	.26	.09	.07
	Grade 12	.61	.61	.57	.19	.22	.43	.22	.12	.08
Mathematics	Grade 11	.55	.45	.55	.25	.19	.36	.17	.10	.09
	Grade 12	.51	.46	.55	.22	.22	.35	.16	.15	.07
Social Studies	Grade 11	.61	.61	.57	.17	.17	.44	.29	.06	.04
	Grade 12	.60	.61	.55	.21	.24	.45	.21	.13	.08

GATB aptitudes compare favorably with those of other differential aptitude batteries.

The possibility of differences in validity between GATB scores obtained at various grade levels was an important research question in this study. Table 20–39 shows the distributions of differences between initial and retest validity of the GATB aptitudes for five criteria

Table 20–34. Median Validity Coefficients for Grade 11 and Grade 12 Scores on the Aptitudes of the GATB for 14 Samples of High School Girls Tested Initially in Grade 11 and Retested in Grade 12

Criterion	Grade in which tested	Median Validity Coefficient by Aptitude								
		G	V	N	S	P	Q	K	F	M
Academic Standing	Grade 11	.63	.64	.57	.25	.36	.42	.27	.18	.23
	Grade 12	.66	.64	.59	.18	.36	.39	.31	.11	.12
Science	Grade 11	.53	.53	.47	.25	.27	.34	.20	.15	.16
	Grade 12	.51	.51	.45	.10	.27	.34	.19	.12	.11
Commercial	Grade 11	.49	.46	.50	.19	.35	.40	.25	.25	.20
	Grade 12	.51	.47	.53	.14	.38	.39	.31	.23	.24
English	Grade 11	.63	.67	.55	.26	.28	.38	.29	.20	.25
	Grade 12	.64	.67	.56	.17	.30	.39	.32	.15	.18
Mathematics	Grade 11	.50	.38	.52	.26	.20	.32	.15	.15	.11
	Grade 12	.51	.41	.55	.18	.26	.36	.19	.11	.09
Social Studies	Grade 11	.57	.63	.42	.22	.26	.36	.22	.12	.16
	Grade 12	.61	.63	.49	.17	.24	.35	.23	.09	.09

Table 20–35. Median Validity Coefficients for Initial and Retest Scores on the Aptitudes of the GATB for 8 Samples of High School Students in the Foreign Languages Criterion Groups by Sex and Grade Level When Initially Tested

Sex	Grade in which tested	Median Validity Coefficient by Aptitude								
		G	V	N	S	P	Q	K	F	M
Boys	Grade 9	.32	.34	.41	.02	.18	.30	.07	.04	.02
	Grade 12	.27	.36	.47	.08	.16	.35	.07	.07	.02
Girls	Grade 9	.54	.42	.49	.19	.16	.39	.19	.12	.10
	Grade 12	.52	.51	.44	.15	.14	.24	.18	.11	.12
Boys	Grade 10	.40	.42	.42	.08	.08	.35	.17	.03	.04
	Grade 12	.41	.47	.44	.16	.19	.33	.12	−.01	−.03
Girls	Grade 10	.48	.45	.40	.21	.13	.28	.12	.04	.01
	Grade 12	.51	.46	.46	.13	.16	.24	.08	.06	.07
Boys	Grade 11	.46	.42	.52	.15	.16	.30	.09	.04	.15
	Grade 12	.42	.45	.43	.09	.19	.29	.09	.02	.00
Girls	Grade 11	.47	.41	.46	.17	.15	.26	.10	.01	.07
	Grade 12	.50	.49	.42	.08	.16	.27	.19	.04	.00

of high school performance (excluding Commercial and Foreign Language course grades). While a difference as great as .15 was found in one instance between initial and retest validity coefficients, the typical differences were negligible. The largest differences in validity were, in fact, in favor of the validity of the initial test. Sex differences in the relative effectiveness of early prediction with the GATB were negligible.

The results of this study support the conclusion of Jacobsen that the GATB can be used

Table 20–36. Median Validity Coefficients for Initial and Retest Scores on the Aptitudes of the GATB for 6 Samples of High School Boys in the Commercial Course Criterion Group by Grade Level When Initially Tested

Grade in Which Tested	Median Validity Coefficient by Aptitude								
	G	V	N	S	P	Q	K	F	M
Grade 9	.37	.36	.42	.08	.24	.39	.10	.03	.23
Grade 12	.38	.39	.46	.05	.22	.27	.18	.04	.14
Grade 10	.45	.40	.56	.13	.31	.46	.24	.12	.07
Grade 12	.44	.42	.54	.01	.34	.47	.25	.15	.10
Grade 11	.46	.39	.45	.17	.19	.47	.22	.10	.14
Grade 12	.43	.32	.54	.18	.22	.37	.24	.14	.14

Table 20–37. Distributions of Sex Differences in Validity of the GATB Aptitudes for Predicting Five Criteria of High School Performance for Three Classes Combined

Difference (Girls—Boys)	Academic Standing		Science		English		Mathematics		Social Studies	
	Initial	Retest	Initial	Retest	Initial	Retest	Initial	Retest	Initial	Retest
.20 to .22	1									
.17 to .19	1				1					
.14 to .16	0	2			0					
.11 to .13	0	0			2				2	1
.08 to .10	6	2	1	1	2	5	1	1	4	3
.05 to .07	4	5	1	1	6	6	3	2	6	2
.02 to .04	5	7	5	2	5	6	4	10	5	7
−.01 to .01	6	4	8	8	5	1	3	7	3	4
−.04 to −.02	3	4	9	7	4	5	11	4	3	5
−.07 to −.05	0	3	1	6	1	3	5	2	1	1
−.10 to −.08	0		2	1	1	1		0	2	3
−.13 to −.11	1			0				1	0	0
−.16 to −.14				0					1	1
−.19 to −.17				1						
−.22 to −.20										
Median	.04	.03	−.01	−.02	.04	.04	−.02	.02	.03	.02

Note.—Negative sign indicates Boy Correlation is lower.

for guidance purposes as early as the 9th grade of high school for both boys and girls.

FOLLOW-UP STUDY ON OCCUPATIONAL AND COLLEGE PERFORMANCE

To be of maximum effectiveness in the educational-vocational counseling of students in the lower high school grades, aptitude tests should have demonstrated validity for occupational and college success.

Extensive data on the relationship between the aptitudes of the GATB and criteria of success in a variety of occupations have been obtained through the continuing Federal-State Employment Service cooperative test development program. Aptitude norms have been established for a large number of specific occupations and groups of occupations on the basis of this research. (See Chapters 9 and 11 of this Section.) However, little of this research has been conducted on samples tested with the GATB as high school seniors and followed up to obtain criterion data on occupational success. No research of this kind has been done on samples tested with the GATB in lower high school grades. Thus, there is a need for longitudinal validation of the GATB against occupational criteria using samples of students tested during high school.

Table 20–38. ***Four Most Valid GATB Aptitudes for Each of 7 High School Performance Criteria***

Criterion	Sex	Four Most Valid Predictors			
Academic Standing	Boys	G	V	N	Q
	Girls	G	V	N	Q
Science	Boys	G	V	N	Q
	Girls	G	V	N	Q
English	Boys	V	G	N	Q
	Girls	V	G	N	Q
Mathematics	Boys	G	N	V	Q
	Girls	N	G	V	Q
Social Studies	Boys	V	G	N	Q
	Girls	V	G	N	Q
Foreign Language	Boys	N	V	G	Q
	Girls	G	N	V	Q
Commercial	Boys	N	G	Q	V
	Girls	N	G	V	Q

Several studies have been conducted which show a substantial relationship between the GATB and success in a variety of college academic fields. (See Chapter 12 of this Section.) However, this research has been conducted using samples of students already in college at the time of GATB testing. Thus, there is a need for longitudinal research to determine the validity of GATB aptitudes for predicting success in college using samples of students tested during high school.

The purpose of the two-year phase of the GATB follow up study on occupational and college performance was to determine the predictive validity of the GATB for occupational success and for academic success in college. Specific aspects of the prediction of occupational success were (1) relating GATB aptitudes to occupational success criteria for individual occupations and (2) relating qualifying vs. non-qualifying scores on OAP's to occupational success. Specific aspects of prediction of early college success were relating GATB aptitudes to a dichotomous criterion (academic failure vs. not an academic failure two years after high school graduation) for individual colleges and for types of colleges.

Procedure

As indicated in Figure 20–1, which shows the data collection schedule for the series of three longitudinal studies on high school students, the potential sample consisted of the students tested initially with the GATB in the ninth, tenth, and eleventh grades in 1958 and retested in the twelfth grade. This group was divided into subsamples as follows:

Sub-sample	Initially Tested		Year Retested in Grade 12	Number
	Grade	Year		
1	11	1958	1959	6800
2	10	1958	1960	7140
3	9	1958	1961	6264

An attempt was made to follow up all individuals in the three subsamples two years

Table 20–39. Distributions of Differences in Initial and Retest Validity of Aptitudes of the GATB for Predicting Five Criteria of High School Performance

	12th—9th		12th—10th		12th—11th		Total	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
.08 to .10	3	1	3	1			6	2
.05 to .07	4	5	8	5	6	2	18	12
.02 to .04	12	9	11	15	12	10	35	34
−.01 to +.01	15	11	15	12	16	13	46	36
−.04 to −.02	3	10	6	11	9	9	18	30
−.07 to −.05	6	8	0	1	0	7	6	16
−.10 to −.08	2		2		2	2	6	2
−.13 to −.11		1				1		2
−.16 to −.14						1		1
Total	45	45	45	45	45	45	135	135
Median Difference	.01	.00	.01	.01	.01	−.01	.01	.00

Note.—Negative sign indicates Grade 12 correlation is lower.

after high school graduation. Note that the number of cases in the three subsamples differs from that shown in Table 20–1. The reasons for the discrepancies are that some cases included in the follow up were later eliminated from the analysis because of incomplete test data and two States did not maintain follow up records for Subsample 3.

The basic source of information for the follow up was an "Address Sheet" completed by the individuals at the time they were retested. The sheet provided information on present address and telephone number, social security number, and name, address, and telephone number of parent, next closest relative, and another person who would be likely to know the location of the individual two years later. Arrangements were made for each individual to be assigned a social security number.

For each subsample the State employment service test research analysts of the nineteen participating States applied a variety of techniques in attempting to locate the individuals and identify their employers, colleges attended or other status (such as housewife, military service, etc.) two years after high school graduation. They were very successful in obtaining this information for the three subsamples. The number of individuals located and the per cent of the potential sample this represents is as follows for the three subsamples: 5,904 (86%) for Subsample 1; 6,711 (94%) for Subsample 2; and 6,181 (99%) for Subsample 3. A variety of techniques were used including letters to individuals in sample using address shown on "Address Sheet"; letters to individuals in sample using address obtained from others on "Address Sheet"; letters to individuals in sample using address obtained from city or telephone directory; letters to individuals in sample using address obtained from Department of Motor Vehicles; letters to individuals in sample using address obtained from high school attended; letters to individuals in sample using address obtained from other sources; personal visits; State agency "wage item" file; telephone calls; local office records and employee knowledge; information obtained from individuals in community; and other techniques. An article by Droege and Crambert (1965) gives details about the relative success of the various techniques.

Data collection for the occupational phase of the follow up study was restricted to those individuals employed full time two years after high school graduation in the same State in which they were tested with the GATB. Housewives, self-employed, unemployed, and personnel of the armed services were not included in the follow up. An attempt was made to obtain an interview with the supervisor of each individual qualifying for inclusion in the occupational follow up. During the interview, ratings were obtained on a descriptive rating scale regularly used for USTES test development studies. The descriptive rating scale, covering the following aspects of job performance, is similar to that shown in the *Test Development Guide*, Vol. I (Manpower Administration, 1969): quality, quantity, accuracy, job knowledge, aptitude for the work, flexibility, resourcefulness, practical suggestions, and overall performance. Ratings were obtained only for the individuals in the sample who had been in the occupation long enough to have completed the training period. In connection with the rating interview, the Employment Service test development analyst made a determination of the DOT title and code of the occupation performed by the individual being rated by the supervisor.

Data collection for those included in the college phase of the follow up was restricted to those enrolled full time in colleges and universities in the United States two years after high school graduation and those who had dropped out of college after being enrolled full time. For each individual who had attended college full time, the college or university he attended was asked to provide the following information:

1. Number of semesters (or quarters) completed
2. Type of college. For purposes of this study colleges were classified into the following:
   a. 2 or 3 year colleges
   b. 4 or 5 year colleges
3. Information as to whether the individual was an "academic failure"

Follow up data for the individuals in the occupational and in the college phase of the study were punched on IBM cards by the State employment services participating in the study and then sent to the national office where the data were processed and analyzed.

Results of Occupational Follow Up

The first analysis was based on occupations in which at least 50 individuals were employed two years after high school graduation. There were 15 of these. The aptitude validity coefficients (using the descriptive rating scale criterion) for these occupations are shown in Table 20–40.

The data in Table 20–40 show that, although the validities tend to be low, many are statistically significant. No significant validity coefficients were obtained for three of the 15 occupations. There may be a variety of reasons why the validities are lower than those typically found in test development studies. Each occupational sample consisted of workers from many different job locations, and many different supervisors were involved in making criterion ratings. The variation in the specific job duties from one location to another and variation in rating standards from one supervisor to another would tend to depress validity coefficients for aptitudes that have relevance for job success. Another factor which may have contributed to the low validities is use of tests in selection of workers for the occupations represented. To the extent that tests were used by employers in preselection, the range of scores of job-related aptitudes would be restricted, leading to a lowering of validity coefficients.

An additional analysis was made of the data for Sales Clerk; Clerk, General Office; Clerk-Typist; Stenographer; and Secretary. For these occupations the samples were large enough to make comparisons between validities of initial aptitude scores in lower high school grades and validities of retest scores in the 12th grade. Significant (.05 level) differences between validities of initial scores (in a lower high school grade) and 12th grade retest scores were obtained in 9 of the 135 comparisons, or 7% of them. (The 12th grade scores had the higher validity in five cases, the lower

Table 20–40. Product-Moment Correlations Between Retest Aptitude Scores, High School Academic Standing and Experience and Descriptive Rating Scale Criterion for Samples of 50 or Greater—Two-Year Follow-up

Third Edition DOT Code

VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	210.388 (N = 53)	209.588 (N = 52)	219.388 (N = 322)	212.368 (N = 54)	237.368 (N = 70)	213.582 (N = 73)	201.368 (N = 249)	202.388 (N = 271)	203.588 (N = 74)	209.388 (N = 254)	223.387 (N = 78)	290.478 (N = 133)	332.271 (N = 84)	915.867 (N = 69)	922.887 (N = 69)
Academic Standing	.02	.14	.19**	.14	.22	.28*	.17**	.15*	.05	.11	.06	.17	.12	.18	.32**
G—Intelligence	.17	–.08	.15**	.25	.17	.17	.14*	.13*	.17	.07	–.20	.21*	.12	–.10	.27*
V—Verbal Aptitude	.03	.04	.12*	.11	.18	.26*	.13*	.12*	.12	.08	–.21	.18*	.02	–.15	.32**
N—Numerical Aptitude	.18	.05	.17**	.16	.25*	.18	.16*	.09	.28*	.15*	–.06	.20*	.04	.14	.20
S—Spatial Aptitude	.12	–.17	.06	.17	.06	–.08	.05	–.01	.10	–.04	–.08	.06	.21	–.15	.15
P—Form Perception	–.02	–.16	.19**	.26	.13	–.03	.04	.13*	.09	.01	.03	.20*	.06	–.16	.12
Q—Clerical Perception	–.03	.06	.18**	.20	.02	.21	.12	.12	.12	.06	.03	.10	.08	–.02	.32**
K—Motor Coordination	–.03	.10	.05	.11	.21	.16	.07	.14*	.01	.10	–.02	.14	–.09	–.08	.17
F—Finger Dexterity	.52**	–.08	.02	.08	.34**	.22	.08	.13*	.10	.03	.08	.02	.13	–.07	.01
M—Manual Dexterity	.22	.07	.03	.15	.30*	.24*	–.02	.24**	.05	.03	.30**	.16	.01	.04	.30*
Experience	.04	–.04	.02	.15	.08	.10	.14*	.23**	.20	.12	.12	.39**	.09	.38**	.06

*Significant at the .05 level.
**Significant at the .01 level.

Key

1. Bookkeeper
2. Clerk, General
3. Clerk, General Office
4. Teller
5. Receptionist
6. Key-Punch Operator
7. Secretary
8. Stenographer
9. Typist
10. Clerk-Typist
11. Stock Clerk
12. Sales Clerk
13. Cosmetologist
14. Automobile-Service-Station Attendant
15. Laborers

validity in the other four cases.) This is about the percentage that would be expected to be significant by chance, indicating no evidence of difference between predictive validity of initial and retest scores.

An analysis was made to determine the relationship between pass-fail on Occupational Aptitude Patterns (June 1966 edition) and occupational success as measured by the descriptive rating scale. Subsamples of individuals who entered occupational fields corresponding to each OAP were established. For each of these subsamples, the relationship between pass-fail on the OAP and the descriptive rating scale score was determined. At this point only preliminary results are available. They indicate that, for the OAP's with at least 50 cases, the OAP validities tend to be low, ranging from .00 to .26. Additional data processing and analysis are required before final conclusions can be made. This additional analysis will be done using the 1970 edition of the OAP's (See Chapter 10).

Results of College Follow Up

The first analysis was based on the 16 colleges for which at least 50 cases were available and in which the per cent of failure for academic reasons was at least 10% over the two year period. The validity coefficients (using the academic success vs. academic failure criterion) for these colleges are shown in Table 20–41. For purposes of this analysis high school overall academic standing and the retest aptitude score data were used as the predictors and all subsamples were included. The data in Table 20–41 show that there is considerable variation from one college to another with regard to the order of size of validity coefficients and in relative validity of the various aptitudes. There are various reasons for this finding, including variations in course content during the first two years, variations in proportions of individuals who become early academic failures, and extent to which preselection on tests related to GATB tests occurred. Thus, although it is possible to do some generalizing regarding prediction of early academic failure, there is enough variation from one college to another to conclude that local validation would provide a significant amount of additional information on validity to make the effort worthwhile.

A second analysis was made for colleges grouped by type. Type I colleges consisted of those requiring 2 or 3 years of study; Type II colleges consisted of those requiring 4 or 5 years of study. Table 20–42 shows the validity coefficients (using the academic success vs. academic failure criterion) for Type I and Type II colleges separately for males and females tested with the GATB initially in the ninth, tenth, and eleventh grades. Samples 13–24, in the lower half of Table 20–42 are random halves of their counterpart samples 1–12 in the upper half of the table. The validities are shown only for those variables which tend to have the highest validities for the individual schools (see Table 20–41).

The following conclusions seem reasonable:

1. Validity of GATB scores in the lower high school grades is about as good as the validity of retest scores in the twelfth grade.
2. Validity for males is about as good as validity for females.
3. There is little difference in the pattern of aptitude validities for Type I and Type II colleges.
4. The predictor with the highest validity is over-all academic standing in high school.
5. Aptitudes G, V, N and Q have validities high enough to be useful to the high school counselor in discussing college plans with students in lower high school grades.

Seven Year Followup

Data collection has been completed for a follow up seven years after high school graduation. The final sample consists of those students tested initially in the ninth, tenth, and eleventh grades in 1958, retested in the twelfth grade, and successfully followed up seven years after high school graduation to obtain criterion data on college and occupational performance. Data are being processed by the Utah Test Development Field Center.

Additional analyses are required to develop appropriate norms consisting of combinations

Table 20–41. Biserial Correlations Between GATB Retest Scores and High School Academic Standing and Academic Success—Failure Criterion for Individual Colleges

College	N	A.S.	G	V	N	S	P	Q	K	F	M
Citrus J. C.	233	.54	.16	.25	.22	.00	.16	.20	.26	.34	.06
Palomar Col.	234	.58	.22	.20	.28	−.04	−.04	.15	.28	−.08	−.07
Calif. State Poly. Col.	52	.66	.37	.24	.53	−.02	.21	.28	−.08	.37	−.02
San Diego State Col.	50	.50	.36	.47	.44	.13	.00	.23	.46	−.06	−.13
Univ. Calif. All Campuses	73	.67	.06	.05	.25	.00	.02	.15	.18	.28	−.03
Colo. State Univ.	118	.70	.45	.30	.42	.17	.05	.24	.13	.17	−.02
Colo. State Col.	63	.43	.14	.25	.03	.07	.04	.24	−.12	−.13	−.14
Teachers Col. of Conn.	71	.32	.40	.48	.06	.10	−.11	.21	.06	.14	−.08
Univ. of Conn.	146	.22	.17	.18	.02	.02	.03	−.21	.05	.21	.09
Fla. State Univ.	52	.19	.21	.52	.12	−.06	−.07	.29	.12	.13	−.06
Univ. of Fla.	58	.26	.15	.48	−.25	−.02	.07	.09	.23	.39	.30
Iowa S. T. C.	81	.67	.71	.45	.64	.34	.06	.18	.10	−.06	−.34
Western Mich. Univ.	68	.26	.04	.17	.03	−.18	.16	.42	.26	.43	.14
Dickinson S. T. C.	117	.32	.18	.32	.12	−.07	−.14	.24	.19	−.17	−.35
Univ. of Chattanooga	74	.58	.16	.07	.15	.35	−.04	.29	.34	.33	.12
Univ. of Wis.	118	.26	.07	.18	.08	.15	.01	.19	.13	−.09	−.01

of aptitudes and cutting scores for use in predicting early academic failure in college. The analyses will be based on data for the samples indicated in the top half of Table 20–42 with cross-validation on the data for samples indicated in the lower half of Table 20–42.

Table 20–42. Biserial Correlations Between GATB Aptitudes G, V, N, and Q and High School Academic Standing (A.S.) and Academic Success-Failure Criterion Separately By Sex, Grade, and College Type

Sample	Type	N	A.S.	Initial Score				Retest Score			
				G	V	N	Q	G	V	N	Q
1 9th Males	I	161	.50	.18	.06	.28	.08	.14	.14	.28	.13
2 10th Males	I	174	.48	.09	.03	.12	−.06	−.04	−.09	.15	−.14
3 11th Males	I	137	.45	.42	.23	.39	.20	.57	.32	.52	.32
4 9th Females	I	171	.47	.29	.21	.32	.27	.23	.18	.27	.12
5 10th Females	I	154	.36	.15	.18	.27	.43	.37	.30	.43	.08
6 11th Females	I	136	.59	.40	.45	.39	.27	.09	.22	.25	.26
7 9th Males	II	459	.36	.16	.12	.03	.07	.25	.15	.18	.09
8 10th Males	II	476	.31	.14	.19	.11	.12	.23	.26	.17	.24
9 11th Males	II	409	.42	.31	.31	.25	.15	.23	.23	.23	.17
10 9th Females	II	368	.42	.24	.25	.20	−.02	.28	.26	.35	.16
11 10th Females	II	400	.46	.24	.10	.39	.19	.16	.15	.30	.22
12 11th Females	II	343	.18	.18	.23	.19	.04	.22	.26	.22	−.01
13 9th Males	I	174	.35	.16	.07	.26	.12	.03	−.16	.18	.06
14 10th Males	I	176	.37	.07	.10	−.05	−.05	.19	.26	.17	.06
15 11th Males	I	122	.30	.25	.18	.34	.20	.30	.30	.38	.24
16 9th Females	I	188	.44	.27	.10	.44	.24	.08	.10	.21	.13
17 10th Females	I	176	.55	.32	.36	.31	.02	.26	.24	.23	.03
18 11th Females	I	129	.24	.24	.17	.10	−.21	.01	.08	−.02	−.08
19 9th Males	II	458	.37	.16	.22	.22	.17	.22	.22	.23	.12
20 10th Males	II	464	.32	.19	.23	.23	.20	.26	.23	.26	.21
21 11th Males	II	423	.26	.21	.21	.18	−.02	.21	.22	.09	−.02
22 9th Females	II	359	.42	.31	.17	.31	.21	.28	.23	.35	.15
23 10th Females	II	400	.56	.37	.29	.36	.32	.29	.32	.27	.31
24 11th Females	II	361	.37	.10	.12	.11	.08	.26	.28	.24	.14

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21. Use of the GATB With the Disadvantaged

The current emphasis on occupational counseling and placement of the disadvantaged has resulted in an increased awareness of the problems of testing the disadvantaged. While the GATB was developed to provide measurements over a broad range of ability, there are definite limitations in its use with the more severely disadvantaged. This chapter presents a discussion of these limitations and describes a procedure for determining an individual's ability to take the GATB. The U. S. Training and Employment Service is engaged in an extensive program of research on testing the disadvantaged, including the development of nonreading tests which will be used with the educationally deficient in lieu of the GATB.

Since educational deficiency is the most pervasive factor in disadvantage, a major consideration in using a test with the disadvantaged is the extent to which basic educational skills are required by the test. Of the 12 tests of the GATB, eight require no reading or arithmetic ability. These eight tests provide measures of Spatial Aptitude, Form Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The four tests which do require reading or arithmetic ability enter into the measures of General Learning Ability, Verbal Aptitude, Numerical Aptitude and Clerical Perception. The educationally deficient individual will obviously be handicapped on the tests that require reading or arithmetic ability, and may be at a disadvantage on some of the other tests as well due to a lack of exposure to tests in general, or other factors stemming from the disadvantaged environment. Since the GATB is used for occupational prediction, a key question is whether these same factors which handicap test performance also handicap job performance without intervening literacy training. In other words, do the tests have the same validity for the disadvantaged as for the non-disadvantaged? This is one of the areas in which the U.S. Training and Employment Service is currently conducting research.

The original cutoff for administering the GATB to an individual was six years of education. Those with fewer than six years of education were excluded from the general working population sample. This level was set on the basis of an analysis of the reading difficulty of the directions. However, since the amount of formal education does not accurately indicate an individual's reading level, USTES has developed a formal screening procedure which helps to identify those who should not be administered the GATB. The use of this screening procedure is described in detail later in this chapter.

Another factor which should be considered in using a test with disadvantaged individuals is the composition of its normative samples. The major normative group for the GATB (see in Chapter 3) was occupationally representative of the general working population and as such included a high proportion of individuals at the lower socio-economic levels. Blue-collar workers comprised nearly 60% of the total sample and the average amount of education for the total sample was 11.0 years. However, the representation of persons at the lower socio-economic levels was restricted to some degree by the fact that no one with less than six years of education was included in the sample. Also, several lower level occupational groups were eliminated from the base population on the grounds that aptitude tests were not used in placement for these groups. However, these limitations of the General Working Population norms are of little importance to the point under discussion, for these norms are used only as a general reference point for the GATB. An individual's vocational potential is properly evaluated by comparison of his test results with the norms established for specific occupations and groups of occupations. These occupational norms are based on samples of job applicants, employed workers or trainees, as described in Chapter 8, and are completely independent of the general working population norms. The level of education of the occupational samples naturally varies with the socioeconomic level of the occupation. An inspection of the characteristics of the occupational samples (see Chapter 9) will reveal that the average education of the samples for unskilled and semi-skilled jobs is typically less than high school graduation and very often is less than the general working population sample's average of 11 years of education.

THE GATB SCREENING PROCEDURE

The inability of an individual to follow test instructions or to read and understand test items renders the administration of certain tests unfair as valid measures of the aptitudes and abilities which the tests are intended to measure. The GATB Screening Exercises (U. S. Department of Labor, 1969) provide the counselor with a quick (5 to 10 minutes), objective assessment of the counselee's ability to follow test instructions and to read and to understand test items in the GATB. Those who fail should be considered for testing with the Nonreading Aptitude Test Battery (NATB), designed for use with the disadvantaged (U.S. Department of Labor, 1970).

The "Exercises" are limited in their effectiveness, in that they will identify only those individuals lacking the minimum basic skills for taking the GATB. It is likely that many individuals who pass the "Exercises" will obtain aptitude scores lower than their true abilities. Counselors using scores obtained by individuals with low education or literacy skill should assume that these individuals have at least the aptitude demonstrated, and perhaps more.

The GATB Screening Exercises should be used during the counseling interview when the counselor would like to have aptitude test results for a counselee for whom he has some doubt as to the applicability of the GATB tests and the counselee's ability to take the tests.

As a result of the interview, the counselor may question whether the GATB is appropriate for the counselee because of his cultural and educational limitations. If the counselor suspects that the counselee has educational or cultural limitations, he may use the Screening Exercises to help determine whether the individual should take the GATB or the NATB. If it is evident that the counselee is definitely handicapped, either culturally or educationally, and should not be tested with the GATB, then the counselor may not need to use the Screening Exercises. In this instance the examinee should be considered for testing with the NATB.

In the absence of specific research validating the screening device, its effectiveness as an indicator of which test battery to administer is not known. For this reason, the counselor should regard it as only an aid in making the decision, not as a rigid screen. The counselor should use all information about the counselee that would have a bearing on the question of determining whether he should administer the GATB or the NATB and whether some form of pretesting orientation would be appropriate. Another possibility which should be considered in some cases is to recommend no testing at all because the individual is too disadvantaged or unmotivated.

The complete GATB screening procedure is as follows:

1. Prior to testing, the counselor administers the GATB Screening Exercises, which consist of four practice items from the Vocabulary Test and three practice items from the Three-Dimensional Space Test of the GATB. (The administration of these items is not done with the usual test directions but involves special directions.) Administration time is between 5 and 10 minutes. Most individuals who have at least one item correct on both the vocabulary and spatial exercises can be scheduled to take the GATB in regular group sessions. Those who do not have any items correct on either the vocabulary or spatial exercises, "fail" and may be scheduled to take the NATB.

2. During the testing session, the test administrator notes any tests on which the individual is unable to understand the directions or follow the required test-taking procedure. Ap-

titude scores should not be derived for any tests so identified.

3. In scoring the tests aptitude scores should not be derived for any test on which the individual obtained a raw score of zero.

Even with the application of the above, the counselor should bear in mind that some or all of the aptitude scores obtained by a disadvantaged individual may be depressed by his limited education, poor test-taking motivation, or other factor originating in the disadvantaged environment. Personal factors other than tested aptitudes (see Chapter 22) should, therefore, be given even greater weight in evaluating the disadvantaged person's occupational potential.

THE NONREADING APTITUDE TEST BATTERY

The NATB was developed for use with the disadvantaged individuals who lack the literacy skills to take the GATB. In developing the NATB, the GATB was used as a model for the following reasons: (1) the GATB measures the most important vocationally significant aptitudes and (2) the GATB has been validated against occupational criteria, the norms providing a ready-made basis for interpreting scores on the NATB. The research leading to the NATB is described in Section II of the NATB *Manual* (U.S. Department of Labor, 1970). Results of this developmental research indicated that cautious operational use of the battery is justified when scores are used in conjunction with GATB occupational norms.

The following is a brief description of tests which make up the Nonreading Aptitude Test Battery:

1. *Picture-Word Matching (Test A)*.—A 42-item test in which the examinee must determine which of five pictures associates best with a stimulus word read by the examiner. These items are in order of increasing difficulty for low education individuals. Measures Aptitudes G and V.

2. *Oral Vocabulary (Test B)*.—Contains 45 items which must be read to the examinee. The examinee must decide whether the two words are the same, opposite, or different. These items are in order of increasing difficulty for low education individuals. Measures Aptitudes G, V, and N.

3. *Coin Matching (Test C)*.—A 63-item test in which the examinee must indicate whether two groups of coins have the same value. Measures Aptitude N.

4. *Matrices (Test D)*.—Contains 29 matrix type items which are in order of increasing difficulty for low education individuals. Measures Aptitudes G and N.

5. *Tool Matching (Test E)*.—This test consists of a series of exercises containing a stimulus drawing and four black-and-white drawings of simple shop tools. The examinee indicates which of the four black-and-white drawings is the same as the stimulus drawing. Variations exist only in the distribution of black and white in each drawing. Contains 48 items. Measures Aptitude P.

6. *Three-Dimensional Space (Test F)*.—This test consists of a series of exercises containing a stimulus figure and four drawings of three-dimensional objects. The stimulus figure is pictured as a flat piece of metal which is to be either bent, or rolled, or both. Lines indicate where the stimulus figure is to be bent. The examinee indicates which one of the four drawings of three-dimensional objects can be made from the stimulus figure. Contains 40 items. Measures Aptitudes G and S.

7. *Form Matching (Test G)*.—This test consists of two groups of variously shaped line drawings. The examinee indicates which figure in the second group is exactly the same size and shape as each figure in the first or stimulus group. Contains 48 items. Measures Aptitude P.

8. *Coin Series (Test H)*.—Three subtests, of which Part I has 72 items, Parts II and III each have 46 items. The examinee must mentally manipulate the coins according to the assigned system. Measures Aptitude N.

9. *Name Comparison (Test I)*.—This test consists of two columns of names. The examinee inspects each pair of names, one in each column, and indicates whether the names are the same or different. Contains 150 items. Measures Aptitude Q.

10. Mark Making (GATB Part 8)

11. Place (GATB Part 9)
12. Turn (GATB Part 10)
13. Assemble (GATB Part 11)
14. Disassemble (GATB Part 12)

PRETESTING ORIENTATION TECHNIQUES

Common problems encountered in assessing the disadvantaged are unfamiliarity with and a fear of tests, both of which tend to lower performance, thereby giving an inaccurate picture of ability. Several pretesting orientation techniques are being developed to counter these common problems. The first of these, a booklet on "Doing Your Best on Aptitude Tests," is on public sale at the Government Printing Office. A second technique, "USES Pretesting Orientation Exercises," provides practice on tests like those in the GATB. A third technique, "Pretesting Orientation on the Purpose of Testing," is an illustrated lecture-discussion and is on public sale at the Government Printing Office.

The booklet "Doing Your Best on Aptitude Tests" is intended as pretesting orientation for individuals who possess minimum literacy skills but who may be unfamiliar with the types of tests to be given and may be uneasy about being tested. The booklet will be useful to the large number of individuals who may be somewhat disadvantaged but can read well enough to take an aptitude test battery such as the GATB. It may be given to individuals who are scheduled for aptitude tests or it may be placed on a rack for applicants to help themselves.

The "USES Pretesting Orientation Exercises" offer controlled practice in test taking to individuals who possess minimum literacy skills for taking the GATB but who may have little experience with aptitude tests and may be uneasy about being tested. They consist of sets of items similar to those in Parts 1–8 of the GATB. Their use in pretesting orientation sessions will provide experience in group test taking in a non-threatening atmosphere to disadvantaged applicants scheduled to take the GATB. The exercises are flexible enough that they can be shortened for individuals who need a refresher orientation to tests or can be presented in full in an intensive orientation program.

"Pretesting Orientation on the Purpose of Testing" was developed to help remove misconceptions about the purpose of testing and to provide practical test-taking hints. It consists of 23 pictures, available in flip-chart or booklet form, and a prepared script explaining each picture. It can be used with individuals or groups, administered without change or modified to meet local conditions, administered in one or two sessions, and used alone or in combination with other types of pretesting orientation. Materials for administering this pretesting orientation, on public sale at the Government Printing Office, are as follows:

Manual for Pretesting Orientation on the Purpose of Testing

Illustrations for Pretesting Orientation on the Purpose of Testing (Booklet)

Illustrations for Pretesting Orientation on the Purpose of Testing (Flip-Charts)

RETESTING

The usual reasons for having an adult retested with the GATB are (1) illness or extreme nervousness during testing (2) a timing or other error on the part of the test administrator (3) unfavorable conditions during testing, for example poor lighting or excessive noise. An additional circumstance occurs in dealing with the disadvantaged. Persons should be retested with appropriate parts of the GATB when they have received significant additional training and experience after the initial testing. An alternate form should always be used for retesting.

Individuals tested with the NATB are educationally deficient. Those who subsequently improve their literacy skills substantially by enrolling in appropriate training may be retested with the GATB after training. (The B–1002B edition should be used because the B–1002A edition has the same test items as the NATB for several of the tests.) Such retesting is desirable because, for individuals with adequate literacy skills, the GATB is more valid than the NATB as an indicator of occupational aptitude.

REFERENCES

U.S. Department of Labor. *Guide to the GATB Screening Exercises.* Washington: Government Printing Office, 1969.

U.S. Department of Labor. *Manual for the USTES Nonreading Aptitude Test Battery* (Sections 1 and 2). Washington: Government Printing Office, 1970.

22. Use of Test Results

NORMS

Description of Adult Norms

General Aptitude Test Battery norms are established for specific occupations. (See Chapters 8 and 9 of this Section.) These are used in job placement.

For counseling purposes, GATB norms are established in terms of a structure composed of a series of Occupational Aptitude Patterns, or OAP's. Each Occupational Aptitude Pattern consists of the most significant aptitudes together with cutting scores on these aptitudes established as minimum scores for groups of occupations having similar aptitude requirements. (See Chapters 10 and 11 of this Section.) The norms structure includes various combinations of the 9 aptitudes measured by the GATB, which were isolated on the basis of factor analysis studies involving 59 different tests and 9 experimental groups totaling 2,156 individuals. (See Chapter 3 of this Section.) The norms (OAP's) have been validated on the basis of data collected on various occupational groups. The methods used in this validation together with appropriate statistics pertaining to the procedures employed may be found in Chapters 10 and 11 of this Section. Chapters 5 and 7 of this Section explain in detail how the GATB was standardized on a general working population sample of 4,000 individuals and how the scores were derived for the aptitudes measured through the use of separate tests; in addition, an explanation is included indicating that an aptitude score of 100 is "average" and that the standard deviation of the distribution of scores for each aptitude is 20. Thus, a score of 100 represents the 50th percentile for the general working population; a score of 80 is one standard deviation below the average and represents the 16th percentile for the general working population (only 16% of the general working population make lower scores); a score of 120 is one standard deviation above the average and represents the 84th percentile; a score of 140 is two standard deviations above the average and represents the 98th percentile.

In the use of the GATB, the Occupational Aptitude Patterns (see Section II of the *Manual for the GATB*) are the starting points for considering the occupational fields for which the counselee received qualifying aptitude scores. When the counselor desires to narrow down the vocational choice of the individual, the norms established for the appropriate specific occupation in that occupational field covered by the OAP should be used. In the GATB norm structure, those occupations preceded by an asterisk are those for which specific norms are available. Additional information on this subject may be found in Chapters 8 and 9 of this Section.

While some test batteries of other publishers provide for separate sex norms, the GATB has not been set up on this basis. Studies we have conducted have yielded results which are consistent with those of other investigators in that it was found that males make lower scores on tests measuring Clerical Perception (Aptitude Q) but males make higher scores than females on tests measuring Spatial Aptitude (Aptitude S). There may be sex differences on other aptitudes as well. (See Chapter 17 of this Section.)

Accordingly, if separate sex norms were established for the GATB, men would be given a bonus on Aptitude Q, and women on Aptitude S. As a result, men with lower scores than women would be placed in clerical jobs and women with lower scores than men would be placed in jobs having specific requirements of spatial ability. Such a procedure would be contrary to our philosophy that the amount of ability required is that which is necessary to satisfactorily perform in the job. Hence the USTES practice is to evaluate ability qualifications in terms of job requirements regardless of sex.

9th and 10th Grade Norms

In addition to the adult norms, Occupational Aptitude Pattern norms have been established which permit the use of the GATB for counseling 9th and 10th grade students. Since 9th and 10th grade students have not reached aptitudinal maturity, they tend to have lower aptitude scores than adults. Therefore, 9th and 10th grade cutting scores for each OAP are lower than those for adults. Information on the development of OAP norms for 9th and 10th graders can be found in Chapter 20 of this Section.

Selection of Appropriate Level of Norms

Research has shown that the adult aptitude norms should be used with high school juniors and seniors but that ninth and tenth grade norms should be used with freshmen and sophomores. This procedure should be followed when the GATB is used in schools.

When the GATB is administered to out-of-school youth, the adult norms should be used with those who are at least 16 years of age. For youth who are 14 or 15 years old, the norms to be used are dependent on the immediacy of the youth's entry in the labor market. For example, for a 14-year old school dropout who is training with the objective of acquiring a particular skill, and the training involved would be at least a year's duration, the counselor should use the ninth grade norms. For a 15-year old school dropout with a similar objective, the tenth grade norms should be used. However, for a 14- or 15-year old youth who is not interested in any further training or re-entry into school but wants immediate referral to a job, specific adult aptitude norms should be used. This is necessary because the youth will be competing with adults for adult jobs.

Comparing Test Results with Occupational Norms

The multiple cutoff technique is used to determine aptitude qualifications for fields of work. There are a number of advantages to the use of a multiple cutoff procedure. (Dvorak, 1956) After the various tests of the General Aptitude Test Battery have been scored and the aptitude scores have been obtained, the counselor must determine the most suitable field or fields of work for the individual by comparing his aptitude qualifications with occupational norms. This is accomplished through the use of two specially designed cards, one indicating the norms, specified numerically, for the various designated occupational fields, and the other containing the individual's aptitude scores. These cards are referred to, respectively, as the Minimum Aptitude Score card and the Test Record or Individual Aptitude Profile card. Separate Minimum Aptitude Score cards have been developed for adult norms, 9th grade norms, and 10th grade norms.

The Test Record Card shows an individual's actual aptitude scores and his aptitude scores after addition of one Standard Error of Measurement (SE_m). The SE_m of a test is an index of the accuracy or reliability of individual scores on the test and is expressed in the same units as the test score itself. See Chapter 15 of this Section for information on the SE_m's established for each of the nine aptitudes in the GATB. The SE_m's are preprinted on the Test Record Card between the two rows of aptitude scores. There are two versions of the Test Record Card. One version is prepared when answer sheets are hand scored. The other version is prepared by machine when answer sheets are sent to National Computer Systems for machine scoring on optical scanning equipment. (See Section I of GATB manual for samples of these two cards.) When answer sheets are hand scored, the Test Record Card is folded on the groove and placed on the appropriate Minimum Score Card so that the individual's aptitude scores appear just above the respective aptitude scores making up the norms indicated for the first Occupational Aptitude Pattern. The scorer then determines by inspection how the aptitude scores made by the individual compare with the corresponding minimum aptitude scores on that row. This step is repeated for each OAP by moving the Test Record Card down the minimum score card and comparing the individual's scores with the minimum aptitude scores listed in each pattern. The bottom row of the Test Record Card is then unfolded and the procedure is repeated with the aptitude scores plus one SE_m. When answer sheets are machine scored by National Computer Systems, both sets of aptitude scores are compared against all OAP's automatically and the results are reported back on the NCS Test Record Card. For further explanation of procedures for scoring OAP's, refer to Section II of the *Manual for the GATB.*

When an individual's GATB scores are compared with norms for an OAP, a letter grade "H", "M" or "L" is assigned for each OAP. The procedure for assigning a letter grade is as follows:

1. If the individual's obtained scores meet or exceed the norms on all three aptitudes, a letter grade of "H" is assigned.
2. If the individual's obtained scores plus one standard error of measurement (SE_m) meet or exceed the norms on all three aptitudes, a letter grade of "M" is assigned.
3. If the individual's scores are below the requirements for an "M", the letter grade "L", is assigned.

The interpretation of these letter grades is as follows:

H—The individual's scores equal or exceed those of workers judged to be satisfactory in the occupations. If he is also qualified on the basis of factors other than aptitudes, there is a good probability that he will do well on the job.

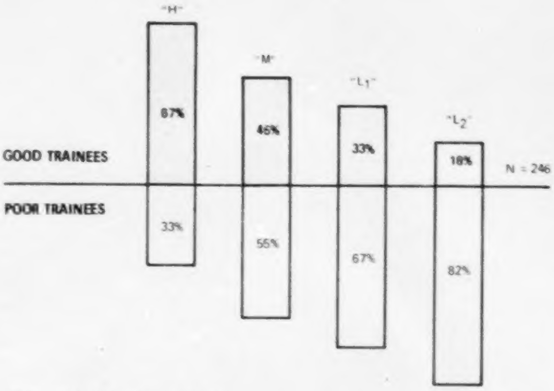
M—The individual's scores are close to those of workers judged to be satisfactory in the occupations. However, the chances of his doing well on the job are somewhat lower than that of persons in the "H" category.

L—The individual's scores are similar to or below those of workers found to be unsatisfactory in the occupations. The probability of his being satisfactory on the job is low and he should be considered for other jobs which utilize his stronger aptitudes.

The appropriateness of the H-M-L interpretation of test scores was demonstrated by the Minnesota agency in a study of 246 individuals referred to one of eighteen different MDTA training courses started between July 1968 and June 1969. As shown in Figure 22–1, 67% of the individuals who scored "H" on the appropriate battery were good trainees while 45% of those who scored "M" were good trainees and between 18 and 35% of those who scored "L" were good trainees. (In this study the "L" group was subdivided into two groups: The "L_1" group contained those invididuals whose scores failed to meet the "M" requirement on one aptitude only while the "L_2" group contained those individuals whose scores failed to meet the "M" requirement on two or more aptitudes.)

The individual's test results may also be shown graphically on a special form called the GATB Indicator which was introduced in 1966. While this form was designed primarily for use in placement, it can be of assistance in interpreting test results for counseling purposes as well. Test results are shown on the Indicator in terms of confidence bands representing one standard error of measurement on either side of the obtained score. The confidence band, which represents the area in which it is reasonably sure that the individual's true score lies, is intended to remind the counselor of the error inherent in all test scores. The standard errors of measurement used for the Indicator,

Fig. 22–1. Effectiveness of the "H", "M" and "L" method of GATB Test Score Interpretation.



Note: "L_1" = "L" on 1 aptitude only.
"L_2" = "L" on 2 or more aptitudes.

and the source of the data from which they were derived, are shown in Chapter 15 of this Section. The width of the confidence bands used for 9th and 10th graders is the same as that for adults.

The Indicator may be filled in manually by locating the individual's score on each aptitude scale, then indicating the appropriate confidence band on each side of the score by shading. National Computer Systems, Inc., 4401 West 76th Street, Minneapolis, Minnesota 55435, has developed an automated system of printing the confidence bands on the GATB Indicator as a by-product of their optical scanner scoring service for the GATB.

After the individual's test results have been entered on the form, cutting scores for specific occupations or OAP's can be indicated on the scales so that the test results and occupational norms can be easily compared. An illustration of the GATB Indicator, front and reverse sides, is shown on pages 364 and 365. The illustration shows the form completed for an applicant who is being considered for placement in three jobs, as follows:

Die Cutter (S–123), cutting scores S–75, M–80.
Punch Press Operator (S–44), cutting scores P–75, M–90.
Pattern Maker (S–132), cutting scores N–90, S–100, P–80.

The applicant's aptitude scores are:

N–96
S–95
P–90
M–145

As indicated in the illustration, the job Die Cutter is identified in the legend by the code letter A. The cutting scores for Die Cutter are indicated on the appropriate aptitude scales, S and M, with the code latter A. When test results are being compared with OAP norms rather than specific occupational norms, the OAP numbers can be entered in the spaces normally used for job titles, and the code letters can be used to indicate the OAP cutting scores on the aptitude scales.

Advantages and Limitations of GATB Norms

The use of a standard battery of tests with occupational norms makes it feasible to test all of a person's major vocational abilities in one sitting and to interpret his scores in terms of a wide range of occupations. This has many advantages over the use of separate tests, each standardized on different norm groups (Super, 1950). Furthermore, the grouping of jobs into families according to their aptitudinal requirements considerably lightens the counselor's task of determining the occupational significance of the counselee's test scores.

Another advantage of the GATB is that only the aptitudes required for successful performance in the jobs covered by an OAP are included in the norms. Thus, it is not necessary to show profiles for the various occupations on all the aptitudes in the battery. One cannot assume, just because an occupational sample happens to have a certain set and level of abilities, that all those abilities and levels are required by the job. For example, during World War II data obtained from a study of a group of women airplane instrument assemblers revealed that the average score on vocabulary was very high. However, there was a negligible correlation between vocabulary scores and the criterion of job proficiency. Furthermore, nothing in the job analysis information indicated that verbal ability was required by the job. Analysis of the personal data for the sample revealed that it was composed primarily of former school teachers who found that they could make more money in defense plants than in teaching school. Unfortunately, this kind of problem is not solved by using the longitudinal design since, even if test scores had been available on these women from their having been tested long before they entered the airplane instrument assembly job, the chances are good that they would have had high vocabulary scores. They certainly did not acquire their vocabularies working on the assembly job. Any occupational ability pattern based on typical scores for all the abilities, including vocabulary, would still have been merely a description of the abilities they happened to have. Thus, while some test batteries may establish norms based on the profile of all aptitudes measured by the battery, GATB norms include only the

NAME *JOHN DOE* SOCIAL SECURITY NO. *999-99-9999* DATE OF TESTING *12-15-66*

CONFIDENTIAL

GENERAL APTITUDE TEST BATTERY INDICATOR

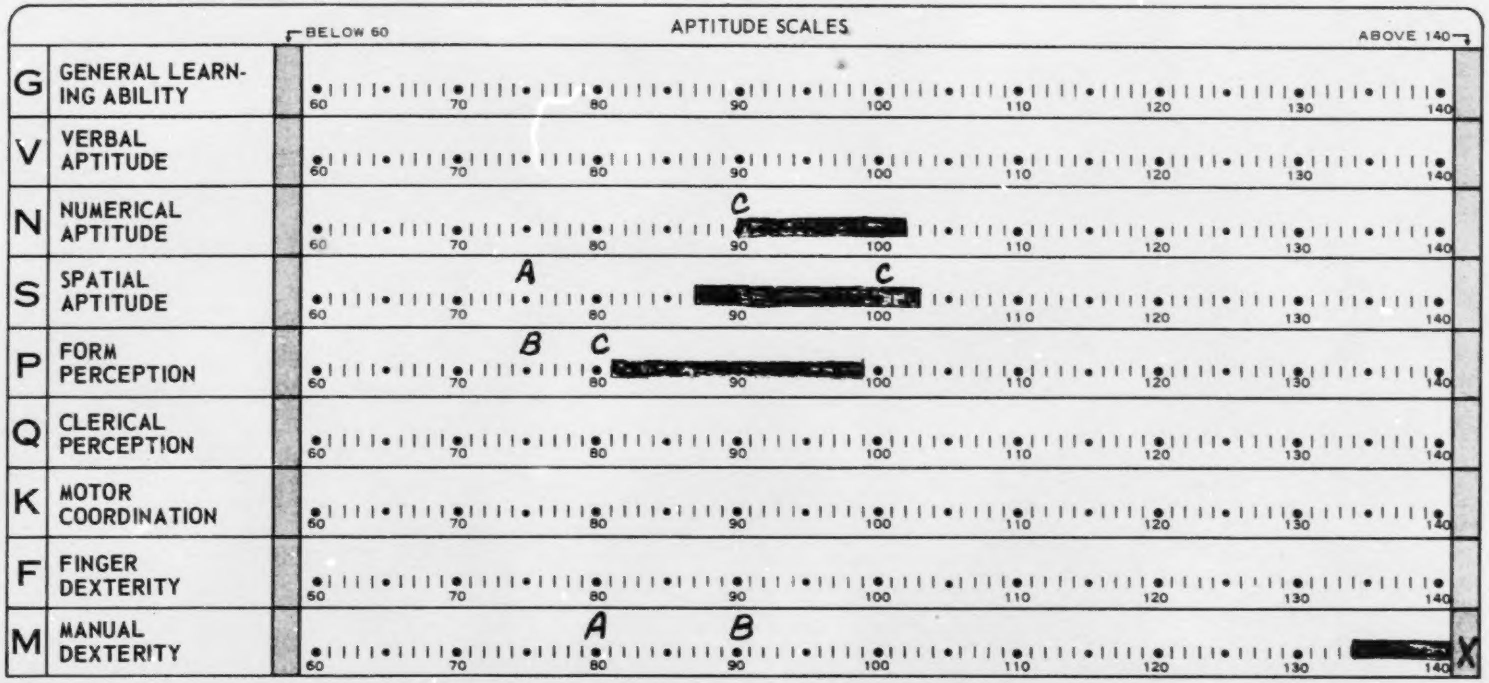
Produced by:
NATIONAL COMPUTER SYSTEMS
Minneapolis, Minnesota 55435

FOR USE BY *A.B.C. COMPANY*
(ORGANIZATION)

ES OFFICE ADDRESS
STATE EMPLOYMENT SERVICE
1234 MAIN AVENUE
MIDDLETOWN

LEGEND (SEE REVERSE SIDE FOR EXPLANATION)

CODE	JOB TITLE	APTITUDES				CODE	JOB TITLE	APTITUDES			
A	*DIE CUTTER*	*S*	*M*			F					
B	*PUNCH PRESS OPERATOR*	*P*	*M*			G					
C	*PATTERN MAKER*	*N*	*S*	*P*		H					
D						I					
E						J					



USE OF TEST RESULTS

363

YOUR PUBLIC EMPLOYMENT SERVICE

The purpose of this test report is to help the employee increase the range of his job opportunities and the employer to better relate employees to jobs.

This report, when used according to instructions, can be a help to job seekers in maximizing their potentials, and in obtaining employment. It is an aid to the work of the guidance counselor.

This report evolved out of employment service research and was designed to aid in the interpretation of the GATB.

This is one among many of the services rendered by your public Employment Service to job seekers, employers, and counselors.

The Employment Service is available to serve all who seek its services. Please do not hesitate to call or visit your local office for information and service.

GATB APTITUDE DEFINITIONS

Aptitude G – General Learning Ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school.

Aptitude V – Verbal Aptitude. The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs.

Aptitude N – Numerical Aptitude. Ability to perform arithmetic operations quickly and accurately.

Aptitude S – Spatial Aptitude. Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

Aptitude P – Form Perception. Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Aptitude Q – Clerical Perception. Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation.

Aptitude K – Motor Coordination. Ability to coordinate eyes and hands or fingers rapidly in making precise movements with speed. Ability to make a movement response accurately and swiftly.

Aptitude F – Finger Dexterity. Ability to move the fingers and manipulate small objects with the fingers, rapidly or accurately.

Aptitude M – Manual Dexterity. Ability to move the hands easily and skillfully. Ability to work with hands in placing and turning motions.

HOW TO USE THE GATB INDICATOR

GATB Norms for Specific Jobs

The legend on the front of this form shows a code letter for each job and the aptitudes required for that job as shown by validation studies. The aptitudes for each job have cutting scores which were established in those validation studies. The aptitude cutting scores for job A are indicated at the appropriate points on the required aptitude scales by the letter A. The cutting scores for other jobs are shown in the same way using the code letters for the jobs.

Applicant's Aptitude Test Results

The applicant's test results are shown in terms of confidence bands. Each band represents the limits within which we can be reasonably sure that the applicant's true score lies. (The level of confidence is the obtained score $\pm 1SE_M$.)

Relating Test Results to Aptitude Norms

The applicant's aptitude qualifications for a particular job are derived by comparing his test results (confidence bands) with the test norms (aptitude cutting scores).

REMEMBER, results of aptitude tests should not be regarded as the sole basis for selection, but should be considered in conjunction with all other information available about the individual.

significant abilities that are required by the occupation.

The GATB norms use the multiple cutoff method, with a minimum score or critical score on each significant aptitude. There is no total weighted score to be obtained. (See Chapter 8 of this Section.) This is another advantage of the GATB since a deficiency of one significant aptitude cannot be compensated for by a superabundance of another.

While the General Aptitude Test Battery offers many advantages, counselors nevertheless should be aware of its limitations. Even though a large variety of occupational groups are already covered by the GATB, not all occupations are included in the norm structure. Hence, when the results indicate that the counselee does not meet the qualifications for any of the Occupational Aptitude Patterns, the counselor cannot assume that the counselee's pattern of abilities is unsuitable for any kind of work. However, test and occupational data are continually being obtained and additional occupations and groupings are being added to the norm structure.

INTEGRATION OF GATB RESULTS WITH OTHER INFORMATION

Factors Involved in Individual Appraisal

Since many factors, in addition to aptitude appraisal, determine the ultimate degree of success and satisfaction an individual derives from his work, it is of vital importance for the counselor to integrate and explain test results along with other factors so that the counselee can develop a suitable vocational goal and plan. Figure 21–2 indicates the various characteristics, including aptitudes, which should be considered in helping the counselee to see himself in vocational terms. The characteristics of the individual appear in the segments within the circle while the methods used by the counselor to obtain the appraisals are indicated by arrows outside of the circle.

Figure 22–2 helps to make evident the complexity of the counselor's task of integration, particularly when it is realized that consideration must also be given to opportunities offered by the labor market before a suitable occupational plan can be formulated with the counselee. For this reason test results should be interpreted in the course of a counseling interview in terms of the individual's probable occupational success and satisfaction when considering all other pertinent factors. It seems clear that, since this is such an involved and complex procedure, it probably would do more harm than good to simply furnish the counselee with a record of his test results without providing a complete and meaningful interpretation during the course of an interview. Indeed Super (1962, p. 638) has pointed out that counselees have desired "copies of test reports (1) when testing has been overemphasized, (2) when the discussion of test results was not successfully integrated with counseling, (3) when the client's own insecurity led him to believe that he could use a report of test results to sell himself to a potential employer more successfully than he could on the basis of his experience, education, and conduct in the employment interview, and (4) when parents and others want tangible evidence of the results of counseling."

In the process of integrating the various types of information pertaining to the individual, the counselor integrates the GATB results with all the other information obtained by other methods such as the interview, doctors' reports

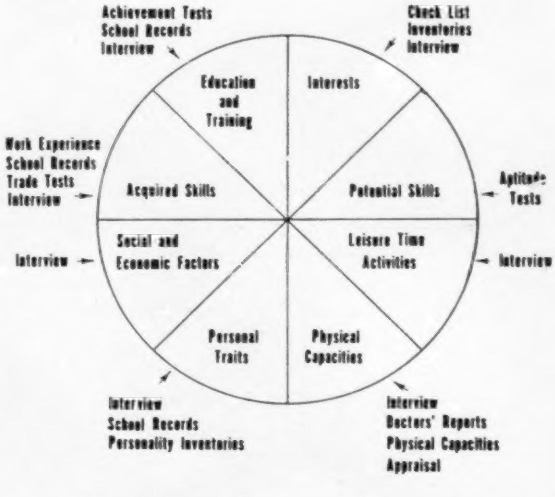

Achievement Tests
School Records
Interview
Check List
Inventories
Interview
Education and Training
Interests
Work Experience
School Records
Trade Tests
Interview
Acquired Skills
Potential Skills
Aptitude Tests
Interview
Social and Economic Factors
Leisure Time Activities
Interview
Personal Traits
Physical Capacities
Interview
School Records
Personality Inventories
Interview
Doctors' Reports
Physical Capacities Appraisal

Fig. 22–2. Factors in appraisal of the individual.

and school records. This enables him to consider all the factors that may have a bearing on the counselee's occupational success and satisfaction: interests, potential skills, leisure activities, physical capacity, personal traits, social and economic factors, acquired skills, and education and training. Since there is no mathematical formula for putting all these ingredients together, the counselor must put them together and season the whole with a good dose of common sense. Obviously, he cannot merely determine the field of work for which the counselee makes the highest GATB test scores and assume that his job is done, because that kind of work may be incompatible with the counselee's interest, physical capacities, or some other factor. While this process is going on, the individual is encouraged to explore these various factors in arriving at a suitable vocational choice and a plan of action designed to help him achieve his vocational objective. In the final analysis, successful counseling depends upon the ability of the counselor to provide the applicant with sufficient information about himself and about the job market so that the client can decide upon a suitable vocational goal and plan which he accepts as desirable and achievable.

Interests

Frequently the stated interests of individuals are not based on verified experiences bearing a relationship to the occupations under consideration. This is particularly true in the case of younger persons whose opportunities are definitely limited for really knowing what the demands are of the various occupations in which they may have expressed interest. This is understandably so since, in our culture, the world of work is largely unexplored by the student until after the completion of his secondary schooling. In any case, further exploration of the true occupational interests of the individual is indicated. First, it should be determined whether or not the counselee is familiar with the occupation for which there appears to be some evidence of interest. Second, if this approach reveals little or no familiarity with the work situation, it would be advisable to investigate the possibility of having the counselee gain some acquaintance with the jobs or fields of work under consideration by reading about them, by observing workers perform the tasks involved, or by talking about the jobs with successful workers in the field.

Even in the case of interest scores on validated inventories, research has demonstrated that the relationship between interest and aptitude scores is relatively low. (Correlations between interest measures and the GATB are shown in Chapter 14 of this Section.) In other words, measured interests and tested abilities are relatively independent of each other, and consequently these two variables usually are correlated only to a very small degree (Super, 1962, pp. 401–403). Under the circumstances, it is not surprising to find individuals who are interested in occupations for which there is no objective evidence of aptitudinal qualification, or to find individuals who show aptitude for types of work in which there is no evidence of interest.

In any event, counselors should be warned against considering measures of interest as evidence of aptitudinal qualifications. In the case of no initial evidence of interest, but marked aptitudinal ability, further exposure to occupational experience or information may reveal latent interests. On the other hand, measures of interests may corroborate GATB results and thus assist in decisions regarding the counselee's occupational possibilities.

Leisure Time Activities

Most people tend to do those things they like and can do well when they are free from the demands of school, the home, or the job. Hobbies or leisure time activities which give individuals an opportunity to try out various activity roles often can be related to occupations and thus provide clues to vocational interests or aptitudes. Therefore, the counselor should not overlook the opportunity for an exploration of the individual's leisure time activities, since this may not only provide further evidence for evaluating the GATB results but may also give direct evidence of individual reactions to types of knowledge or skills having occupational significance. If, for example, GATB results show that the individual has the aptitu-

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dinal qualifications for an occupation related to his leisure time activities, we have further evidence to strengthen the vocational choice indicated by test results. Experienced counselors, of course, are aware that skills of occupational significance may be acquired from sources other than employment, and activities engaged in during the counselee's leisure time may provide clues which will help in relating these to expressed or identified interests, to occupational fields and to aptitude test results. It may be found, for instance, that the counselee, while never having been employed except part time after school and during the summer as a clerk in a grocery store, has spent considerable time repairing his father's automobile. Further questioning also may reveal that he has read a number of articles in "hot-rod" magazines and has frequently referred to text books on the theory of internal combustion engines in order to obtain a working knowledge which would help in making repairs and "tuning-up" the automobile engine. If the GATB results indicate aptitudinal qualifications for the occupation of Automobile Mechanic this would furnish supporting evidence for serious consideration of this type of work by the counselee. Perhaps the counselee also qualifies for the engineering field on the basis of GATB results. The knowledge and skill acquired in repairing automobiles would perhaps be a clue furnishing evidence for considering mechanical engineering as a vocational goal.

Physical Capacities

When relating an individual's test results to prediction of occupational success, one of the other aspects of the counselee which should receive primary consideration is his physical capacity to perform the tasks required by the occupation for which he possesses the aptitudinal qualifications. If, for example, a person meets the minimum aptitude qualifications for the OAP which covers the occupation of Automobile Mechanic, it ordinarily would not be advisable to consider an individual for this type of work if he had an arthritic condition of the spine which prevented him from bending or stooping. Another situation which may confront the counselor is that in which the counselee did not qualify for the norms of any OAP and a physical appraisal shows that the individual is able to perform the tasks involved in many semiskilled or unskilled jobs not covered by the GATB. In such instances there is positive evidence that the counselee will be able to perform the physical requirements of a number of occupations and, providing there is no evidence to the contrary, he should consider outlets in these vocational fields based on other factors. On the other hand, the physical capacities of a person who meets the aptitude levels for all OAP's may restrict his range of choice in a number of occupational fields covered by the OAP structure and hence these occupational fields would not be considered as suitable even though he meets the aptitudinal requirements.

Personal Traits

Personal traits sometimes play a more important role than do aptitudes in determining an individual's suitability for a job and particularly one with a specific employer. This, of course, in no way detracts from the value of aptitude measures but makes it possible to evaluate these in proper perspective. GATB results in themselves provide no indication of the counselee's personal traits. However, some evaluation of an individual's personal characteristics may be obtained from the interview or from contacts made with schools or employers who have had more opportunity to observe the counselee than that afforded by one or two interviews. Thus, while the counselee may meet the aptitudinal requirements of a wide variety of jobs and occupational fields, an appraisal of his personal traits should assist the counselor in helping him to make a satisfactory vocational choice and may help in making a choice involving occupational fields which are not covered by the GATB norm structure. For example, the counselor may note during the course of the interview that the counselee demonstrates a particularly pleasant manner, is well poised and self assured. To the extent one can be assured that this behavior pattern will carry over in the job situation, it may furnish a clue to the consideration of a variety of jobs, such as salesman, receptionist, or hostess.

Social and Economic Factors

Not infrequently the counselor may find it necessary to assist in solving a problem involving financial difficulties or family objections to the acceptance of the counselee's abilities in terms of the occupational fields for which he would be qualified. In such instances an essential part of the counselor's responsibility is to integrate all information about the individual and his environment in order to help him arrive at a decision leading to a satisfactory solution of his problems, overcoming difficulties which may arise because of apparent conflicts between ability and necessity for contributing to support of the family and/or social prestige attached to employment in certain occupational fields. It would be futile to recommend, for example, that a counselee should embark on a four-year college course leading to a degree in mechanical engineering because his test results clearly demonstrated aptitudinal qualifications for that field if, at the same time, his family depended upon him for sole support and there was no possibility of obtaining financial assistance elsewhere. In such a case, the client might well decide to accept immediate employment as a machinist's apprentice and, at the same time, consider a long range plan for enrollment in a night course in college leading to an engineering degree. Such a plan would place the counselee in an immediate field of work which would make use of his differential abilities, with the ultimate goal of obtaining a degree in engineering.

Acquired Skills

Counselors, particularly those dealing with youth, are aware of the importance of part time employment in providing leads which will help in evaluating the counselee's acquired skills and in integrating this appraisal with test results. A young girl, for example, may have been doing clerical and typing work in the high school principal's office while attending school and her test results may show that she has the aptitudinal qualifications for the OAP which includes the job of general clerk. Under the circumstances it would be advisable not only to get the girl's reaction to her job but also to contact the principal's office to determine how well the person performed in her work. If the girl's reaction and the report of the principal's office support the GATB results, employment in the occupational field covered by the OAP should be given serious consideration. Summer employment is another source of valuable information about the individual's acquired skills. Here, too, the reactions of the client and the employer will be valuable in determing whether or not the person's performance on the job coincides with GATB test results and other pertinent information.

Education and Training

The counselee's school record may be used by the counselor in conjunction with GATB test results in making an appraisal of the individual's vocational assets. When a person's GATB results are low but his school records indicate that he was an outstanding scholar, the counselor may wish to retest with another form of the battery. The results of the second testing may show closer agreement with scholastic performance. There may be a number of reasons for the better showing on the retest, the more obvious being that the individual (1) was not properly motivated; (2) was sick and not able to do his best when the test was given; (3) did not understand the direction; or that (4) the test was not timed properly or was not otherwise administered or scored in accordance with standardized instructions.

A different, and perhaps more frequent, situation occurs when an individual makes high scores on the tests but a check of school records reveals poor academic achievement. An individual's numerical aptitude score may be high but a review of his school record may indicate low grades in mathematics; an individual's spatial aptitude score may be high but his school marks in geometry may be low; or an individual's intelligence score may be high but his general scholastic achievement may be low. In these instances, barring the possibility of the individual having obtained the correct test item answers from an outside source, there would be no reason for giving a retest. However, the counselor would be interested in knowing why the counselee's performance was not on a par with his potentialities. It may be that the individual was not interested or sufficiently motivated, that his home life was not conducive to proper study habits or that some more serious emotional problem was the difficulty. In any event, these influences would have to be considered and perhaps dealt with if achievement is expected to measure up to test results.

Counseling of 9th and 10th Graders

The discussion above pertains primarily to the approach used in counseling adults including 11th and 12th graders. Although the factors considered are essentially the same and the approach is similar in counseling 9th and 10th graders, the emphasis is placed on long-range objectives in terms of broad occupational fields and on courses of study leading to those fields, because counseling at the 9th and 10th grade levels should be aimed at broadening of occupational horizons rather than narrowing of choices to one or two specific occupations (Droege, 1960; Super & Overstreet, 1960).

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U.S. Employment Service. Validity information exchange, no. 7–038: D.O.T. code 7–16.900 Decorator, Hand. *Personnel Psychol.*, 1954, 7, 174.

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